Biological and Agricultural Engineering

(College of Agricultural and Environmental Sciences)

Bruce R. Hartsough, Ph.D., Chairperson of the Department

Department Office. 2030 Bainer Hall; (530) 752-0102; *http://www.engr.ucdavis.edu/~bae*

Faculty

Michael J. Delwiche, Ph.D., Professor
Fadi A. Fathallah, Ph.D., Associate Professor
D. Ken Giles, Ph.D., Professor
Mark E. Grismer, Ph.D., Professor *(Land, Air, and Water Resources)*
Bruce R. Hartsough, Ph.D., Professor
David J. Hills, Ph.D., Professor
Bryan M. Jenkins, Ph.D., Professor
John M. Krochta, Ph.D., Professor *(Food Science and Technology)*
Miguel A. Mariño, Ph.D., Professor *(Land, Air, and Water Resources)*
Kathryn McCarthy, Ph.D., Professor *(Food Science and Technology)*
Michael J. McCarthy, Ph.D., Professor *(Food Science and Technology)*
Ning Pan, Ph.D., Professor *(Textiles and Clothing)*
Raul H. Piedrahita, Ph.D., Professor
Richard E. Plant, Ph.D., Professor *(Agronomy and Range Science)*
Uriel A. Rosa, Ph.D., Assistant Professor
R. Paul Singh, Ph.D., Professor
David C. Slaughter, Ph.D., Professor
Shrinivasa K. Upadhyaya, Ph.D., Professor
Jean S. VanderGheynst, Ph.D., Associate Professor
Wesley W. Wallender, Ph.D., Professor *(Land, Air, and Water Resources)*
Ruihong Zhang, Ph.D., Professor

Emeriti Faculty

Norman B. Akesson, M.S., Professor Emeritus
Robert H. Burgy, M.S., Professor Emeritus
William J. Chancellor, Ph.D., Professor Emeritus
Pictiaw (Paul) Chen, Ph.D., Professor Emeritus
Robert B. Fridley, Ph.D., Professor Emeritus
Roger E. Garrett, Ph.D., Professor Emeritus
John R. Goss, M.S., Professor Emeritus
S. Milton Henderson, M.S., Sc.D., Professor Emeritus
R. Larry Merson, Ph.D., Professor Emeritus
John A. Miles, Ph.D., Professor Emeritus
Stanton R. Morrison, Ph.D., Professor Emeritus
James W. Rumsey, M.S., Senior Lecturer Emeritus
Thomas R. Rumsey, Ph.D., Professor Emeritus
Verne H. Scott, Ph.D., Professor Emeritus
Henry E. Studer, M.S., Professor Emeritus
Wesley E. Yates, M.S., Professor Emeritus

Affiliated Faculty

Daniel Downey, Ph.D., Assistant Research Engineer
Dennis R. Heldman, Ph.D., Adjunct Professor
James M. Meyers, Ph.D., Specialist in Cooperative Extension
Zhongli Pan, Ph.D., Assistant Adjunct Professor
James F. Thompson, M.S., Specialist in Cooperative Extension

Major Programs and Graduate Study. For the Bachelor of Science program, see the major in Engineering: Biological and Agricultural, on page 213; for graduate study, see also Graduate Studies, on page 97 in this catalog.

Minor Programs. The Department of Biological and Agricultural Engineering offers two minors through the College of Agricultural and Environmental Sciences: Geographic Information Systems and Precision Agriculture

The minor in Geographic Information Systems is open to all majors, including those in engineering. This minor is for students interested in information processing of spatial data related to remote sensing for geographical and environmental planning and related areas.

The minor in Precision Agriculture is open to all majors, including those in engineering, and acquaints students with recent developments and their applications to agriculture, in geographic information systems, global positioning systems, and variable rate technologies.

Courses. Courses are listed under Applied Biological Systems Technology, and Engineering: Biological and Agricultural *(Biological Systems Engineering)*.

Biological Sciences

(College of Biological Sciences)

College of Biological Sciences, Dean's Office. 202 Life Sciences Additio (530) 752-0410; *http://www.biosci.ucdavis.edu*

Faculty

The Biological Science major and the Bodega Marine Laboratory Spring Quarter Program are offered jointly by the sections of the college. The faculty in the college are members of the Sections of Evolution and Ecology; Microbiology; Molecular and Cellular Biology; Neurobiology, Physiology, and Behavior; Plant Biology. See each section for a list of their faculty.

The Biological Sciences Major

(Sections of Evolution and Ecology; Microbiology; Molecular and Cellular Biology; Neurobiology, Physiology, and Behavior; and Plant Biology)

The Program. The Biological Sciences major is broad in concept, spanning the numerous core disciplines of biology. The Bachelor of Science program includes mathematics, general and organic chemistry, physics, and biology. While emphasizing breadth, the B.S. degree program also features an area of emphasis requirement that provides concentrated attention on one facet of biology at the upper division level. Each area of emphasis coincides with one of the sections of the college. The Bachelor of Arts program emphasizes biological diversity, evolution, and ecology, all built on a foundation of general and organic chemistry, physics and biology. Research and internships are encouraged in both programs.

Career Alternatives. Both degree programs prepare students for admission to graduate schools or professional schools, leading to either a variety of professional health careers or further study in basic and applied areas of biology. They provide suitable preparation for careers in teaching, biological and biotechnological research with various governmental agencies or private companies, government regulatory agencies, environmental consulting, biological illustration and writing, pharmaceutical sales, biological/environmental law, and biomedical engineering.

The A.B. degree program is also appropriate for students interested in teaching biology at the secondary school level and for careers that bear on the ecological problems that require the development of public policy.

A.B. Major Requirements:

UNITS

Preparatory Subject Matter 40-53
- Biological Sciences 1A-1B-1C 15
- Chemistry 2A-2B 10
- Chemistry 8A-8B or 118A-118B-118C 6-12
- Physics 1A-1B or 7A-7B-7C 6-12
- Statistics 13, 32, 100, or 102 3-4
- Recommended: Chemistry 2C and Mathematics 16A-16B.

Depth Subject Matter 38-42
- Biological Sciences 101 and 102 7
- *Evolution:* One from Evolution and Ecology 100, 140; Geology 107; or Plant Biology 116 3-5
- *Ecology:* One from Environmental Science and Policy 100; Evolution and Ecology 101, 117; or Plant Biology 117, 147 4
- *Philosophy of Biological Science:* One from Nature and Culture 100, 120, 140; Philosophy 108; Science and Technology Studies 130A, 130B, 131; or Veterinary Medicine 170 4
- *Physiology:* One from Environmental Horticulture 102; Entomology 101, 102; Neurobiology, Physiology, and Behavior 101; or Plant Biology 111, 112 3-5
- One course each in animal, microbial and plant diversity 8-17
  - *Animal diversity:* Entomology 100, 107, 109; Evolution and Ecology 105, 112+112L, 134; Nematology 110; Wildlife, Fish, and Conservation Biology 110, 111, 120.
  - *Microbial diversity:* Microbiology 105 and 105L, 162; Pathology, Microbiology, and Immunology 127, 128; Plant Biology 118, 148; Plant Pathology 148; Soil Science 111.
  - *Plant diversity:* Evolution and Ecology 108, 119, 140; Plant Biology 102, 108, 116, 119, 147.
- Additional upper division course work in biological sciences to achieve a total of 38 or more units (see "Approved Biology Electives" list below).
- Upper division course work must include at least 2 units (6 hours per week) of laboratory and/or fieldwork.
- Note: Although a course may be listed in more than one category, that course may satisfy only one requirement.

Total units for the major 78-95

B.S. Major Requirements:

UNITS

Preparatory Subject Matter 60-70
- Mathematics 16A-16B-16C or 17A-17B-17C 9-12
- Chemistry 2A-2B-2C 15
- Chemistry 8A-8B or 118A-118B-118C 6-12
- Biological Sciences 1A-1B-1C 15
- Statistics 13, 32, 100, or 102 3-4
- Physics 7A-7B-7C 12

Depth Subject Matter 45
- Biological Sciences 101, 102, 103, 104 13
- Field Requirement, Area of Emphasis Requirement, and additional units (if necessary) to achieve a total of 45 units or more 32
- **Note: Although a course may be listed in more than one category, that course may satisfy only one requirement.**

Field Requirement: Breadth in biology is achieved by completing one course from each field (*a*) through (*e*) below. You must take one course in each field regardless of your area of emphasis. If you plan an area of emphasis in Evolution and Ecology, Marine Biology, or Microbiology, please refer to that area of emphasis before choosing field requirement classes as specific, designated field courses are required. The required courses are listed under that area of emphasis.

Although a course may be listed in more than one category (including the area of emphasis requirements), that course may be used only once and may satisfy only one requirement.

Field Course Lists

(a) Evolution: Anthropology 151, 152, 154A; Evolution and Ecology 100; Geology 107; Plant Biology 143 3-5

(b) Ecology: Anthropology 154B; Biological Sciences 122; Entomology 104, 156; Environmental Science and Policy 100, 121; Evolution and Ecology 101; Microbiology