Major Programs and Graduate Study. For the bachelor of Science program, see the major in Engineering: Biological and Agricultural, on page 245, for graduate study, see also Graduate Studies, on page 111.

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)

Biology Academic Success Center (BASC), 1023 Sciences Laboratory Building; 530-752-0410; http://www.biosci.ucdavis.edu/BASC

Faculty

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

The Biological Sciences Major

(Departments 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 biological sciences. Students of Science (B.S.) 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 departments of the college. The Bachelor of Arts (A.B.) 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 in 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 health careers 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:

<table>
<thead>
<tr>
<th>Preparatory Subject Matter</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biological Sciences 2A-2B-2C</td>
<td>14</td>
</tr>
<tr>
<td>Chemistry 2A-2B-2C</td>
<td>12</td>
</tr>
<tr>
<td>Mathematics 1A-1B</td>
<td>6</td>
</tr>
<tr>
<td>Biology 101, 102 or 103*</td>
<td>10</td>
</tr>
<tr>
<td>(*)Students in the Molecular and Cellular Biology Area of Emphasis must complete Biological Sciences 102+103. All other students may choose between completing Biological Sciences 105 or 102+103.</td>
<td></td>
</tr>
<tr>
<td>Statistics 100</td>
<td>4</td>
</tr>
<tr>
<td>Field Requirement, Area of Emphasis</td>
<td></td>
</tr>
<tr>
<td>Total units for the major</td>
<td>77-94</td>
</tr>
</tbody>
</table>

B.S. Major Requirements:

<table>
<thead>
<tr>
<th>Preparatory Subject Matter</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biological Sciences 2A-2B-2C</td>
<td>14</td>
</tr>
<tr>
<td>Chemistry 2A-2B-2C</td>
<td>15</td>
</tr>
<tr>
<td>Mathematics 1A-1B</td>
<td>6</td>
</tr>
<tr>
<td>Biology 101, 102 or 103</td>
<td>10</td>
</tr>
<tr>
<td>Statistics 100</td>
<td>4</td>
</tr>
<tr>
<td>Field Requirement, Area of Emphasis</td>
<td></td>
</tr>
<tr>
<td>Total units for the major</td>
<td>55-65</td>
</tr>
</tbody>
</table>
Marine Biology emphasis .......................... 12-19

Students choose to complete Biological Sciences 105 or 102+103 for this emphasis.

Field requirement: Students must take Evolution and Ecology 100 to satisfy Field requirement (a), and Evolution and Ecology 101 to satisfy Field requirement (b).

(1) Ocean Processes: At least three units from Biological Sciences 122, Environmental Science and Policy 124, 152, Environmental Science and Policy/Geology 161N, 150A, 150B, 150C, Evolution and Ecology 115; Wildlife, Fish, and Conservation Biology 157 .................. 3-4

(2) Marine Organisms: At least three units from Animal Science 119, 131; Evolution and Ecology 106, 110, 112 and 112L, 114; Neurobiology, Physiology, and Behavior 141; Plant Biology 118; Wildlife, Fish, and Conservation Biology 120 and 121 ........................................................................ 3-5

(3) Immersion Requirement: Complete one of four options listed below, offered in spring quarter or summer sessions at Bodega Marine laboratory, or equivalent. Requires residence at Bodega Marine Laboratory

Option 1 (summer session 1): .............................................. 3

Select one course from: Environmental Science and Policy 124; Evolution and Ecology 106, 110, 114 .......................... 3

Biological Sciences 124 .......................... 3

Option 2 (summer session 2): .............................................. 3

Select one course from: Biological Sciences and Policy 152; Geology 150C .................................................. 3

Biological Sciences 124 .......................... 3

Option 3 (summer session 1): .............................................. 3

Environmental Toxicology/Nutrition 127

Select one course from each of the following two groups: .......................... 6

(a) Biological Sciences 122, 152

Neurobiology, Physiology, and Behavior 141

(b) Biological Sciences 122, 152

Neurobiology, Physiology, and Behavior 141

Each course may only be used in satisfaction of one area of emphasis or field requirement.

Microbiology emphasis ............................................. 16-20

Complete one of four options listed below or complete an individual option with approval from your faculty adviser.

Students choose to complete Biological Sciences 105 or 102+103 for all options:

(1) Microbial Physiology and Molecular Genetics option: ............................................. 15-18

Students must complete Microbiology 104 to satisfy Field requirement (c)

Microbiology 104L, 140, 150 .......................... 9

Select one course from: Microbiology 170; Molecular and Cellular Biology 121 .......................... 3

Select one course from: Microbiology 105 and 105L, 155L; Plant Biology, Microbiology, and Immunology 127 .......................... 3-6

(2) Microbial Diversity and Ecology option: ............................................. 15-17

Students must complete Microbiology 104 to satisfy Field requirement (c)

Microbiology 104L, 105L, 150 .......................... 12

Select one course from: Food Science and Technology 104; Microbiology 140, 150, 162, 170; Pathology, Microbiology, and Immunology 127, 128; Plant Biology 148; Plant Pathology 148; Soil Science 111 .......................... 2-5

(3) Biotechnology and Applied Microbiology option: ............................................. 16-19

Students must complete Microbiology 104 to satisfy Field requirement (c)

Microbiology 104L .......................... 3

Select two courses from: Microbiology 140, 150, 170 .......................... 6

Select one course from: Food Science and Technology 102A, 104 .......................... 3-4

Select one course from: Microbiology 155L; Molecular and Cellular Biology 120L, 160L, 150L .......................... 4-6

(4) Medical Microbiology option: ............................................. 12-20

Students may choose to complete the Field requirement and the laboratory requirement for this option with one course from: Microbiology 101, or Microbiology 104 and 104L. Students are encouraged to complete Microbiology 101 to satisfy Field (c) and this option’s laboratory requirement simultaneously.

Students completing Microbiology 104 for Field (c) must also complete Microbiology 104L to satisfy the laboratory requirement for this option .......................... 3

Pathology, Microbiology, and Immunology 126 .......................... 3-6

Select one course from: Microbiology 140, 150, 170 .......................... 3

Molecular and Cellular Biology emphasis ............................................. 12-17

Students must complete Biological Sciences 110, 02+103 for this emphasis.

(1) Molecular Biology and Gene Expression: ............................................. 3

Molecular and Cellular Biology 121 .......................... 3

(2) Laboratory Experience: One or more laboratory courses from: Biological Sciences 120P, 180L; Molecular and Cellular Biology 120L, 140L, 160L; or other laboratory course to total 3 units (or 9 hours per week) that emphasizes cellular or molecular biology with approval of your faculty adviser .......................... 3-6

(3) Restricted Electives: ............................................. 6-8

Select two or more courses from: Biological Sciences 120, 181, 183; Molecular and Cellular Biology 123, 124, 126, 143, 144, 145, 150, 162, 163, 164, 182; Neurobiology, Physiology, and Behavior 103; Pathology, Microbiology, and Immunology 126; Plant Biology 113, 126; or other courses with faculty adviser’s approval.

Neurobiology, Physiology, and Behavior emphasis ............................................. 15

Students choose to complete Biological Sciences 105 or 102+103 for this emphasis.

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

Select courses from at least two of the following three areas and include one laboratory from Neurobiology, Physiology, and Behavior 101, 104, 141P, or 160L .......................... 15

(1) Neurobiology: Neurobiology, Physiology, and Behavior 100, 106, 112, 124, 125, 126, 160L, 161, 162, 163, 164, 165, 166, 167; Psychology 121, 124, 128, 129.

(2) Physiology: Anatomy, Physiology and Cell Biology 100; Entomology 102, Exercise Biology 101, 110, 111, 125; Neurobiology, Physiology, and Behavior 101, 101L, 103, 104L, 105, 106, 111C, 113, 114, 117, 123, 127, 128, 130, 132, 139, 140, 141, 141P, 152; Pathology, Microbiology, and Immunology 126; Wildlife, Fish, and Conservation Biology 120L.

(3) Behavior: Anthropology 154A, 154C; Entomology 104; Neurobiology, Quarter Offered: F=Winter, I=Spring, S=Summer, V=Summer, 2015-2016 offering in parentheses.

Pre-Fall 2011 General Education (GE): ArH=Arts and Humanities; ScSc=Science and Social Sciences; DD=Dominant Diversity; Wr=Writing Experience

Fall 2011 and on Revised General Education (GE): AH=Arts and Humanities; SE=Science and Engineering; SS=Social Sciences; AC=American Cultures, DD=Dominant Diversity, OL=Oral Skills, SL=Scientific, VL=Visual, WC=World Cultures, WE=Writting Experience
Physiology, and Behavior 102, 150, 152, 159, 162, Psychology 122, 123, 129.

Note: Neurobiology, Physiology, and Behavior 106, 152 or Psychology 129 may be used only once to satisfy Area of Emphasis requirements.

Plant Biology emphasis .......................... 14-17

Students choose to complete Biological Sciences 105 or 102+103 for this emphasis.

Select one course from each of the following four areas. A course may be listed in more than one area or field, but may be used to satisfy only one requirement.

(1) Anatomy and morphology: Evolution and Ecology 140, Plant Biology 105, 116 ................................................................. 4-5
(2) Physiology, development and molecular biology: Plant Biology 111, 112, 113;
Plant Pathology 130 .................................... 3
(3) Evolution and ecology: Evolution and Ecology 100, 117; Plant Biology 117, 143 ......................................................... 3-4

Total Units for the Major ..................... 104-114

Approved Biology Electives

These courses are accepted without petition for upper division units in the Biological Science major. Many other biologically related courses may be substituted with consent of your adviser.

Anatomy, Physiology and Cell Biology 100
Animal Science 170
Anthropology 151, 152, 153, 154A, 154B, 157
Avian Sciences 100, 150
Biological Sciences—All upper division courses
Cell Biology and Human Anatomy 101, 101L
Entomology—All upper division courses
Environmental Horticulture 102, 105
Environmental Science and Policy 100, 110, 121, 123, 124, 150A, 150B, 150C, 151, 151L
Evolution and Ecology—All upper division courses
Exercise Biology 101, 110, 111, 113
Food Science and Technology 102A, 104
Geology 107, 107L, 150A, 150B, 150C
Medical Microbiology 115, 116
Microbiology—All upper division courses
Molecular and Cellular Biology—All upper division courses
Nature and Culture 100, 120, 140
Nematology 100, 110
Neurobiology, Physiology, and Behavior—All upper division courses
Pathology, Microbiology, and Immunology 126, 126L, 127, 128
Philosophy 108
Plant Biology—All upper division courses, except 189
Plant Sciences 112, 130, 131, 135, 142, 144, 150, 152, 153, 157, 158
Plant Pathology 120, 130
Psychology 121, 122, 123, 124
Science and Technology Studies 130A, 130B, 131
Soil Science 111
Veterinary Medicine 170
Wildlife, Fish, and Conservation Biology 110, 110, 111L, 120, 121, 122, 130, 136, 140, 171

Other Upper Division Courses

There is a limitation on variable-unit courses that may be counted toward the major. Of these courses, up to four units of 199 courses may be counted and no units of 192 or 197T courses may be counted.

Minor Program Requirements:

Biological Sciences ........................................... 18

Complete at least three units from each of the five numbered groups to total at least 18 units. Appropriate alternative courses may be used with approval of an adviser.

(1) Cell and Molecular Biology: Biological Sciences 101, 102, 105 .................................................. 3-4
(2) Animal Biology: Anthropology 151, Anatomy, Physiology and Cell Biology 100/
Neurobiology, Physiology, and Behavior 123; Entomology 100; Evolution and Ecology 105, 112 and 112L, 134; Nematology 100, 110; Neurobiology, Physiology and Behavior 100, 101, 102, 117; Wildlife, Fish, and Conservation Biology 110, 111, 120 ................................................................. 2-5
(3) Microbiology: Microbiology 101, 102, 162; Pathology, Microbiology, and Immunology 128; Plant Biology/Plant Pathology 148 ................................................................. 3-5
(4) Plant Biology: Environmental and Resource Sciences/Plant Sciences 144; Plant Biology 105, 111, 112, 116, 126; Plant Biology/Plant Pathology 148; Plant Sciences 141, 171 ................................................................. 3-5
Additional units (if necessary) from above numbered groups to reach 18 units.

Advisers and Advising. Information on the Biological Sciences major or minor can be obtained at the Biology Academic Success Center (BASC) in 1023 Sciences Library Building; 530-752-0410; http://basc.engineering.ucdavis.edu.

Citation for Outstanding Performance.
The College of Biological Sciences confers Citations for Outstanding Performance on undergraduates majoring in Biological Sciences who have demonstrated superior academic performance and individual achievement in research. Students who wish to be considered for a citation must first meet or exceed a specified grade point average and participate in an appropriate research project.

Teaching Credential Subject Representative.
Associate Director of Teacher Education (School of Education); see the Teaching Credential/M.A. Program on page 115.

Bodega Marine Laboratory Program
See also Biological Sciences, Bodega Marine Laboratory Program, on page 186.

http://bml.ucdavis.edu

A full quarter of undergraduate course work in marine biology is available each spring quarter at the Bodega Marine Laboratory, located in Bodega Bay, California. Course offerings include lecture and laboratory instruction in the developmental biology and physiological adaptation of marine organisms, and population biology and ecology, a weekly colloquium, and an intensive individual research experience under the direction of laboratory faculty. (Biological Sciences courses 122, 122P, 123, 199; Neurobiology, Physiology, and Behavior 141, 141F). This is a 15-unit program and course offerings and instruction may vary from year to year. The program is residential, with students housed on the laboratory grounds. Participants are assessed a room and board fee in addition to standard campus registration fees. An application is required. Obtain forms from the Bodega Marine Laboratory website listed above. Applications are due January 31 for spring quarter. Additional information on the Bodega Marine Laboratory Program is available at the Biology Academic Success Center (BASC) in 1023 Sciences Laboratory Building, or directly from Bodega Marine Laboratory, Box 247, Bodega Bay, CA 94923 707-875-2211.

Courses in Biological Sciences (BIS)

Lower Division

2A. Introduction to Biology: Essentials of Life on Earth (5)

Lecture—3 hours; discussion—2 hours. Essentials of life including sources and use of energy, information storage, responsiveness to natural selection and cellular. Origin of life and influence of living things on the chemistry of the Earth. Not open for credit to students who have completed course 1A with a grade of C- or better. GE credit: SciEng | SE—II, III, (I, II, III) Brief, Facciott, Kopp, Roth, Singer

2B. Introduction to Basic Principles of Ecology and Evolution (5)

Lecture—3 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: grade of C- in course 1A or 2A. Introduction to basic principles of ecology and evolution biology, focusing on fundamental mechanisms that generate and maintain biological diversity across scales ranging from molecules and genes to global processes and patterns. Not open for credit to student for who have completed Biological Sciences 1B with a grade of C- or better. GE credit: SciEng | QL, SE, SL, VI—I, II, III, (II, III) Grosberg, Keen, Rosenheim, Schmitt, Schwarz, Spiller, Stichwitz, Strauss

2C. Introduction to Biology: Biodiversity and the Tree of Life (5)

Lecture—4 hours; laboratory—3 hours. Prerequisite: course 1B or 2B completed with a C- or better. Introduction to organismal diversity, using the phylogenetic tree of life as an organizing theme. Lectures and laboratories cover methods of phylogenetic reconstruction, current knowledge of the tree of life, and the evolution of life’s most important and interesting innovations. Not open for credit to students who have completed course 1C with a grade of C- or better. GE credit: SciEng | QL, QL, QL, SE, SL, VI—I, II, III, (II, III) Eisen, Keen, Moore

10. General Biology (4)

Lecture/discussion—4 hours. Concepts and issues in biology. Emphasis on composition and structure of organisms, regulation and signaling, heredity, evolution and the interaction and interdependence among life forms and their environments. Designed for students not specializing in biology. Not open for credit to students who have completed course 1A, 2A or 10V. GE credit: SciEng | SE—II, III, (III)

10V. General Biology (4)


11. Issues in the Life Sciences (5)

Lecture—1 hour; discussion—1 hour. Prerequisite: enrollment limited to BUSP students, consent of instructor. The range of subjects and approaches in the field of biology, including both basic and applied research topics.—I, (II)

11L. Basic Life Sciences Laboratory (2)

Laboratory—6 hours. Prerequisite: enrollment limited to BUSP students, consent of instructor. Basic laboratory skills in life sciences research, including microbiology, molecular biology, and genetics.—IV (W)
20Q. Modeling in Biology (2) Lecture—1 hour; discussion—1 hour. Prerequisite: Mathematics 16B (may be taken concurrently). Introduction to the application of quantitative methods to biological problems. Students will use a mathematical software package to tackle problems drawn from all aspects of biology. 118L. Modeling in Biology (5) Lecture—2 hours; laboratory—3 hours. Prerequisite: courses 1A, 1B, or 1C. This course meets at Bodega Marine Laboratory required. Students will complete a research project in one of the research areas at the Bodega Marine Laboratory. Projects will be selected by a committee of course instructors. Participation granted only.) GE credit: SciEng | OL, QL, SE, VL, WE. 122. Population Biology and Ecology (3) Lecture—2 hours; laboratory—3 hours. Prerequisite: courses 1A, 1B, or 1C. This course meets at Bodega Marine Laboratory required. Biological and physical processes affecting plant and animal populations in the rich array of habitats at the Bodega Marine Laboratory will be discussed. Emphasis on field experience, with complementing lectures to address population and community processes. See Bodega Marine Laboratory Program. GE credit: SciEng | OL, QL, SE, SL, VL, WE. 122P. Population Biology and Ecology/ Advanced Laboratory Topics (5) Laboratory—12 hours; discussion—1 hour. Prerequisite: course 122 concurrently. Residence at Bodega Marine Laboratory required. Students will complete scientific research, from hypothesis testing to publication, including methods of library research. Research related to topic covered in course 122. Final presentation both oral and written. (See description for Bodega Marine Laboratory Program.) GE credit: SciEng | SE, VL, WE. 123. Undergraduate Colloquium in Marine Science (1) Seminar—1 hour. Prerequisite: enrolled student at the Bodega Marine Laboratory. Series of weekly seminars by recognized authorities in various disciplines of marine science from within and outside the UC system. Discussion and problem solving related to current research, from hypothesis testing to publication, including methods of library research. Research related to topic covered in course 122. Final presentation both oral and written. (See above description for Bodega Marine Laboratory Program.) GE credit: SciEng | Se, VL, WE. 124. Coastal Marine Research (3) Laboratory—6 hours; fieldwork—6 hours; laboratory/discussion—1 hour. Prerequisite: upper division standing or consent of instructor; concurrent enrollment in at least one course from Environmental Science and Policy 124, 152, Evolution and Ecology 106, 110, 114; residence at near Bodega Marine Lab required. Must complete the application available at http://www.bml.ucsd.edu. Independent research on top- ics related to the accompanying core Bodega Marine Laboratory summer courses. Students will select one instructor to be a primary mentor, but integrative topics that draw on the expertise of several BML faculty members will be encouraged. May be repeated twice for credit. GE credit: SciEng | OL, QL, SE, VL, WE. 132. Introduction to Dynamic Models in Modern Biology (4) Lecture—3 hours; laboratory—2 hours. Prerequisite: Mathematics 16C, Statistics 13, 1 lower division course in biology, or the equivalents. Dynamic modeling in the biological sciences, including matrix models, difference equations, differential equations, and complex dynamics. Examples include classic models in ecology, cell biology, physiology, and neuro- science. Emphasis on understanding models, their assumptions, and implications for modern biology. GE credit: SciEng | Wi, Wt, VL, WU. 133. Collaborative Studies in Mathematical Biology (3) Lecture/discussion—3 hours. Prerequisite: Mathematics 16ABC or the equivalent, one course from courses 1A, 1B, 1C, 2A, 2B, 2C, 10. GE credit: SciEng | OL, QL, SE, SL, VL, WE. 134. Systems Biology: From Biological Circuits to Biological Systems (2) Lecture/discussion—2 hours; term paper. Prerequisite: course 101 and one from Molecular and Cellular Biology 121, 161, or Plant Biology 113, Mathematics 16ABC or 17ABC, or consent of instructor. Applying systems theory to understand the properties of biological networks in a variety of model organisms. Emphasis on both local biological circuits, and genome-scale biological networks. Top- ics include network motifs, robustness, modeling, emergent properties and interactions in networks. GE credit: SciEng | OL, QL, SE, VL, WE. 180L. Genomics Laboratory (5) Lecture—2 hours; laboratory—6 hours; discussion—1 hour. Prerequisite: course 181 or course 183 may be taken concurrently). Molecular and Cellular Biol- ogy 182. Computational approaches to model and analyze biological information about genomes, trans- scriptomes, and proteomes. Topics include genome assembly; reconstruction of evolutionary history and migration patterns, determination of gene func- tion, prediction of organismal traits, and metage- nomics: determination of community composition and function. GE credit: SciEng | OL, QL, SE, VL, WE. 183. Functional Genomics (3) Lecture—3 hours. Prerequisite: course 101. Comparison of genomes at the population and species level. Genomic techniques for analyzing genomes; methods of inference for (an other) genes, reconstruction of evolutionary history and migration patterns, determination of gene func- tion, prediction of organismal traits, and metage- nomics: determination of community composition and function. GE credit: SciEng | OL, QL, SE, VL, WE. 192. Internship in Biological Sciences (1-12) Internship—3-36 hours. Prerequisite: upper division standing and consent of instructor. (P/NP grading only.) 194H. Research Honors (2) Independent study—6 hours. Prerequisite: senior standing. Students majoring in Biological Sciences who have completed two quarters (3-5 units per quarter) of 199 who and qualify for the honors pro- gram as defined by the current catalog. Opportunity for Biological Sciences majors to pursue intensive research culminating in the writing of a senior thesis with the guidance of faculty advisers. (P/NP grading only.) GE credit: SE, WE. 195A. Science Teaching Internship Program (4) Lecture/discussion—2 hours; internship—6 hours. Prerequisite: upper division standing in a science major or consent of instructor. Basic teaching tech- niques including lesson planning, classroom man- agement, and presentation skills. Interns spend time in K-12 science classrooms working with a master teacher observing, assisting with labs and activities, managing students, and teaching lessons. (P/NP grading only.) 195B. Science Teaching Internship (1-5) Internship—3-15 hours. Prerequisite: course 195A. Reinforcement of teaching techniques learned in 195A with additional classroom experiences in K-12 science classrooms working with a master teacher observing, assisting with labs and activities, managing students, and teaching lessons. May be repeated one time for credit with consent of instructor. (P/NP grading only.)
Biomedical Engineering (A Graduate Group)

J. Kent Leach, Ph.D., Chairperson of the Group
530-754-9149

Group Office: 2316 Genome and Biomedical Sciences Facility 530-752-2611; http://www.bme.ucdavis.edu/graduate/

Faculty
Ralph C. Aldredge, III, Ph.D., Professor
(Biomedical Engineering, Biomechanics)
Sharon Aviram, Ph.D., Assistant Professor
(Biomedical Engineering)
Keith Baar, Ph.D., Assistant Professor
(Neurology, Physiology, and Behavior)
Ramsy D. Badawi, Ph.D., Associate Professor
(Radiology, Biomedical Engineering)
Craig J. Benham, Ph.D., Professor
(Biomedical Engineering, Mathematics)
John M. Boone, Ph.D., Professor
(Radiology, Biomedical Engineering)
Michael H. Bione, Ph.D., M.D., Professor
(Radiology)
Owen Carmichael, Ph.D., Associate Professor
(Neurology, Computation Science)
James Chan, Ph.D., Assistant Professor
(Pathology and Laboratory Medicine)
Abhijit Chaudhari, Ph.D., Assistant Professor
(Radiology)
Ye Chen-Izu, Ph.D., Assistant Professor
(Biomedical Engineering, Pharmacology)
Simon R. Cherry, Ph.D., Professor
(Biomedical Engineering, Radiology)
Blaine Christiansen Ph.D., Assistant Professor
(Osteopathic Surgery, Medicine)
Comlen Clancy, Ph.D., Professor (Pharmacology)
FitzRoy E. Curry, Ph.D., Professor (Physiology & Membrane Biology, Biomedical Engineering)
Cristina Davis, Ph.D., Professor
(Mechanical and Aerospace Engineering)
Yong Duan, Ph.D., Professor
(Biomedical Engineering)
Marc T. Facciotti, Ph.D., Assistant Professor
(Biomedical Engineering)
Katherine W. Ferrara, Ph.D., Professor
(Biomedical Engineering)
David Finley, Ph.D., Professor (Osteopathic Surgery, Medicine, Biomedical Engineering)
Jeffrey C. Gille, Ph.D., Professor
(Chemical Engineering and Materials Science)
Mark Goetz, Ph.D., Associate Professor
(Neurology, Physiology, and Behavior)
Frederic Gorin, Ph.D., Professor
(Neurology)
Dominik R. Haudenschild, Ph.D., Assistant Professor
(Orthopaedic Surgery)
David A. Howse, Ph.D., Professor
(Neurology, Physiology, and Behavior)
Volkmann Heinrich, Ph.D., Associate Professor
(Biomedical Engineering)
Johannes W. Hett, Ph.D., Professor (Pharmacology)
Stephen Howard, M.D., Adjunct Professor
(Mechanical and Aerospace Engineering)
Thomas Huser, Ph.D., Adjunct Professor
(International Medicine)
Sanjay Ishii, Ph.D., Associate Professor
(Mechanical and Aerospace Engineering)
Thomas Jue, Ph.D., Professor (Biological Chemistry)
Richard A. Kisliuk, Ph.D, Professor
(Electrical and Computer Engineering)
Patrice Koehl, Ph.D., Associate Professor
(Computer Science)
Gerald J. Kost, Ph.D., M.D., Professor (Pathology)
Tonya L. Kuhl, Ph.D., Professor (Chemical Engineering and Materials Science, Biomedical Engineering)
Kit S. Lam, Ph.D., Professor
(Biochemistry & Molecular Medicine)
J. Kent Leach, Ph.D., Associate Professor (Biomedical Engineering, Orthopaedic Surgery)
AngelleLouie Louie, Ph.D., Associate Professor (Biomedical Engineering)
Laura Marcu, Ph.D., Professor (Biomedical Engineering, Neurological Surgery)
Dennis L. Matthews, Ph.D., Professor (Neurological Surgery)
Alexander Magliner, Ph.D., Professor (Mathematics)
Christopher J. Murphy, D.V.M., Ph.D., Professor (Surgical & Radiological Sciences)
Jan Nolta, Ph.D., Professor (Internal Medicine)
Stephen O'Driscoll, Ph.D., Assistant Professor (Electrical and Computer Engineering)
Tingxi Pan, Ph.D., Assistant Professor (Biomedical Engineering)
Atul Parikh, Ph.D., Professor (Biomedical Engineering, Chemical Engineering and Materials Science)
Anthony G. Passerini, Ph.D., Associate Professor (Biomedical Engineering)
Jinya Qiu, Ph.D., Professor (Biomedical Engineering)
Brahm Ravani, Ph.D., Assistant Professor (Mechanical and Aerospace Engineering)
A. Hari Reddi, Ph.D., Professor (Orthopaedic Surgery, Medicine)
Alexander Rezvini, Ph.D., Professor (Biomedical Engineering)
Crystal M. Rippplinger, Ph.D., Assistant Professor (Pharmacology)
David Rocke, Ph.D., Distiguished Professor (Biomedical Engineering, Public Health Sciences)
Leonor Saiz, Ph.D., Assistant Professor (Biomedical Engineering)
Neruin Sarigul-Kilin, Ph.D., Professor (Mechanical and Aerospace Engineering)
Michael A. Savageau, Ph.D., Distiguished Professor (Biomedical Engineering)
J. Anthony Scott, Ph.D., Professor
(Electrical and Computer Engineering)
James F. Shackelford, Ph.D., Professor
(Biomedical Engineering)
Vivek J. Srinivasan, Ph.D., Assistant Professor
(Biomedical Engineering)
Susan M. Stover, B.S., M.D., Ph.D., Professor (Anatomy, Physiology and Cell Biology)
J. Kent Leach, Ph.D., Associate Professor (Biomedical Engineering, Medicine: Hematology and Oncology)
Jilu Sultcliffe, Ph.D., Associate Professor (Biomedical Engineering, Medicine: Hematology and Oncology)
Ilias Tagkopoulos, Ph.D, Assistant Professor (Computer Science, Genome Center)
Yoshikazu Takada, M.D., Professor (Dermatology)
Chee Meng Tan, Ph.D., Assistant Professor (Biomedical Engineering)
Alice Tanantal, Ph.D., Professor (Pediatrics, Cell Biology and Human Anatomy, Medicine)
Sebastian Wachsmann-Hogiu, Ph.D., Associate Professor (Pathology and Laboratory Medicine)
John Wener, Ph.D., Professor (Ophthalmology)
Jeffrey Walton, Ph.D., Associate Research Physicist (NMR Facility)
Keith R. Williams, Ph.D., Senior Lecturer (Neurology, Physiology and Behavior)
Soichiro Yamada, Ph.D. Associate Professor (Biomedical Engineering)
Yohei Yokobayashi, Ph.D., Associate Professor (Biomedical Engineering)

Emeriti Faculty
Maury L. Hull, Ph.D., Professor Emeritus (Mechanical and Aerospace Engineering, Biomedical Engineering)

Graduate Study. The Graduate Group in Biomedical Engineering offers programs of study and research leading to the M.S. and Ph.D. degrees. The programs of study prepare students for professional work in the effective integration of engineering with medical and biological sciences. Research strengths lie in the areas of imaging, tissue engineering and regenerative medicine, sensor and MEMS systems, cellular and molecular mechanics, computational modeling, targeted therapeutics, orthopedic biomechanics, biofluids and transport, and human movement. This broad interdisciplinary program is best suited for students who are capable of and comfortable with considerable independence. Each student, together with an advisor, defines a specific course of study suited to individual goals.

Preparation. The Group regards strong competence in mathematics and engineering as necessary for successful completion of study. Prior course work in these areas is emphasized in the evaluation of applications. Some undergraduate training can be acquired after admission to the Group, but it may require an additional year of study.

Courses. See Engineering: Biomedical, on page 250.

Biophysics (A Graduate Group)

Alexei Stuchebrukhov, Ph.D., Chairperson of the Group
530-752-4863; http://bioisci.ucdavis.edu/GradGroups/BPH/

Faculty
Jawdat Al-Bassam, Ph.D., Assistant Professor
(Chemistry)
Toby Allen, Ph.D., Associate Professor (Chemistry)
James B. Ames, Ph.D., Associate Professor (Chemistry)
Elmer L. Post Baldwin, Ph.D., Professor
(Molecular and Cellular Biology)
R. David Britt, Ph.D., Professor (Chemistry)
Tsung-Yu Chen, Ph.D., Associate Professor
(Pharmacology)
R. Holland Cheng, Ph.D., Professor
(Molecular and Cellular Biology)
Colleen Clancy, Ph.D., Associate Professor
(Pharmacology)
Daniel L. Cox, Ph.D., Professor (Physics)
Stephen P. Cramer, Ph.D., Professor
(Molecular and Cellular Biology)
Colleen Clancy, Ph.D., Associate Professor
(Pharmacology)
James F. Shackelford, Ph.D., Professor
(Chemical Engineering and Materials Science)
J. Anthony Scott, Ph.D., Professor
(Electrical and Computer Engineering)
James F. Shackelford, Ph.D., Professor
(Biomedical Engineering)
Vivek J. Srinivasan, Ph.D., Assistant Professor
(Biomedical Engineering)
Susan M. Stover, B.S., M.D., Ph.D., Professor (Anatomy, Physiology and Cell Biology)
J. Kent Leach, Ph.D., Associate Professor (Biomedical Engineering, Medicine: Hematology and Oncology)
Jilu Sultcliffe, Ph.D., Associate Professor (Biomedical Engineering, Medicine: Hematology and Oncology)
Ilias Tagkopoulos, Ph.D., Assistant Professor (Computer Science, Genome Center)
Yoshikazu Takada, M.D., Professor (Dermatology)
Chee Meng Tan, Ph.D., Assistant Professor (Biomedical Engineering)
Alice Tanantal, Ph.D., Professor (Pediatrics, Cell Biology and Human Anatomy, Medicine)