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.ucdavis.edu/graduate/

Faculty

Ralph C. Aldredge, III, Ph.D., Professor
(Mechanical and Aerospace Engineering)

Kyrriacos Athanasiou, Ph.D., Distinguished Professor
(Biomedical Engineering, Orthopaedic Surgery)

Sharon Aviran, Ph.D., Assistant Professor
(Biomedical Engineering)

Keith Baar, Ph.D., Associate Professor
(Pharmacology and Experimental Therapeutics)

Ramsy D. Badawi, Ph.D., Associate Professor
(Mechanical and Aerospace Engineering)

Stanley Benedict, Ph.D., Professor
(Radiation Oncology)

Craig J. Benham, Ph.D., Professor
(Pathology and Laboratory Medicine)

John M. Boone, Ph.D., Professor
(Diagnostic Radiology, Biomedical Engineering)

James Chan, Ph.D., Assistant Professor
(Pathology and Laboratory Medicine)

Abhijit J. Chaudhari, Ph.D., Assistant Professor
(Biomedical Engineering)

Ye Chen-Izu, Ph.D., Associate Professor
(Biomedical Engineering, Pharmacology)

Simon R. Cherry, Ph.D., Distinguished Professor
(Biomedical Engineering, Radiology)

Blaine Christiansen, Ph.D., Assistant Professor
(Orthopaedic Surgery, Medicine)

Calleen Clark, Ph.D., Professor
(Pharmacology)

Cristina Davis, Ph.D., Professor
(Mechanical and Aerospace Engineering)

Sonja Dieterich, Ph.D., Associate Professor
(Radiation Oncology)

Yong Duan, Ph.D., Professor
(Biomedical Engineering)

Marc T. Facciotti, Ph.D., Assistant Professor
(Biomedical Engineering)

Fadi A. Fattahallah, Ph.D., Professor
(Biomedical Engineering)

Sonja Dieterich, Ph.D., Associate Professor
(Radiation Oncology)

Katherine W. Ferrara, Ph.D., Professor
(Cancer Biology and Therapeutics)

David Fyhrie, Ph.D., Professor
(Orthopaedic Surgery, Medicine, Biomedical Engineering)

Jeffery C. Gabeling, Ph.D., Professor
(Chemical Engineering and Materials Science)

Mark Goldman, Ph.D., Professor
(Neurobiology, Physiology, and Behavior)

Frederic Gorin, Ph.D., Professor
(Neurobiology)

Eleonora Grandi, Ph.D., Assistant Professor
(Pharmacology)

Dominik R. Haudenschild, Ph.D., Associate Professor
(Orthopaedic Surgery, Cell and Developmental Biology)

David A. Hawkins, Ph.D., Professor
(Neurobiology, Physiology, and Behavior)

Volkmair Heinrich, Ph.D., Associate Professor
(Biomedical Engineering)

Johannes W. Hell, Ph.D., Professor
(Pharmacology)

Stephen Howell, M.D., Adjunct Professor
(Biomedical Engineering)

Thomas Huser, Ph.D., Adjunct Professor
(Internal Medicine)

Sanjay Joshi, Ph.D., Associate Professor
(Mechanical and Aerospace Engineering)

Thomas Jue, Ph.D., Professor
(Biomedical Engineering)

Joan A. Kass, Ph.D., Associate Professor
(Pharmacology)

Tonya L. Kuhl, Ph.D., Professor
(Chemical Engineering and Materials Science, Biomedical Engineering)

James R. Kass, Ph.D., Professor
(Pharmacology)

John B. Kost, Ph.D., Professor
(Internal Medicine)

Scott L. Kupper, Ph.D., Professor
(Biomedical Engineering, Radiology)

Dennis L. Matthews, Ph.D., Professor
(Neurology)

Alexander J. McLaury, Ph.D., Professor (Mathematics)

Christopher J. Murphy, D.V.M., Ph.D., Professor
(Surgical & Radiological Sciences)

Nitin N. Nithin, Ph.D., Associate Professor
(Food Science and Technology, Biological and Agricultural Engineering)

Jan Nolta, Ph.D., Professor
(Internal Medicine)

Tingrui Pan, Ph.D., Associate Professor
(Biomedical Engineering)

Ailin Parikh, Ph.D., Professor
(Biomedical Engineering, Chemical Engineering and Materials Science)

Anthony G. Parini, Ph.D., Associate Professor
(Biomedical Engineering)

Jinyi Qi, Ph.D., Professor
(Biomedical Engineering)

Bahram Ravani, Ph.D., Professor
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Alexander Rezvani, Ph.D., Professor
(Biomedical Engineering)

Crystal M. Ripplinger, Ph.D., Assistant Professor
(Pharmacology)

David Rocke, Ph.D., Distinguished Professor
(Biomedical Engineering, Public Health Sciences)

Leonard Saiz, Ph.D., Associate Professor
(Biomedical Engineering)

Nesrin Sarigil-Klijn, Ph.D., Professor
(Pharmacology)

Michael A. Savageau, Ph.D., Distinguished Professor
(Biomedical Engineering)

J. Anthony Seibert, Ph.D., Professor
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Erkin Seker, Ph.D., Assistant Professor
(Electrical and Computer Engineering)

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Scott L. Simon, Ph.D., Professor
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Marc T. Facciotti, Ph.D., Assistant Professor
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Colleen Clancy, Ph.D., Professor
(Pharmacology)

Erik J. Furst, Ph.D., Professor
(Diagnostic Radiology)

John Werner, Ph.D., Professor
(Ophthalmology)

Tokihiro Yamamoto, Ph.D., Assistant Professor
(Radiation Oncology)

Maury L. Hull, Ph.D., Distinguished Professor
(Chemical 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 adviser, defines a specific course of study suited to individual goals.

Preparation. The Group requires 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 127.
Yin Yeh, Ph.D., Professor Emeritus

**Graduate Study.** The Biophysics Graduate Group offers a program leading to a Ph.D. degree in biophysics. The interdisciplinary program prepares students to conduct independent research at the interface of physics, chemistry, and biology. Faculty members have particular research interests in structural biology, mechanics, biophysics, biophysics of membranes, and protein-protein interactions. Biomedical applications of optical techniques.

**Courses in Biophysics (BPH) Graduate**

**200A. Current Techniques in Biophysics (3)** Lecture—3 hours. Prerequisite: Biological Sciences 102 or equivalent; Chemistry 110A or equivalent. Current techniques in Biophysics. Topics in 200A include mathematical methods, modeling, mass spectrometry, stochastic process, scanning probe microscopy, electron microscopy, fluorescence, membrane diffusion/mechanics, and single particle tracking. (S/U grading only.)—W. (W.) Faller

**200B. Current Techniques in Biophysics (3)** Lecture—3 hours. Prerequisite: Biological Sciences 102 or equivalent; Chemistry 110A or equivalent. Current techniques in Biophysics. Topics include protein folding, membrane structure and dynamics, Raman spectroscopy, fluorescence resonance energy transfer, time resolved fluorescence, quantum dots, fluorescence imaging, as high-resolution nm, and in vivo nm. (S/U grading only.)—S. (S.) Jue

**200A. Biophysics Laboratory (3)** Laboratory—18 hours. Prerequisite: course 200 (may be taken concurrently). One five-week laboratory assignment in the research laboratory of a Biophysics Graduate Group faculty member. Individual research problems with emphasis on methodological/procedural experience and experimental design. May be repeated for credit four times. —F. W. S. (F, W, S.)

**200B. Biophysics Laboratory (6)** Laboratory—two 18-hour rotations. Prerequisite: course 200 (may be taken concurrently). Two five-week laboratory assignments in the research laboratories of Biophysics Graduate Group faculty members. Individual research problems with emphasis on methodological/procedural experience and experimental design. May be repeated for credit two times. —F. W. S. (F, W, S.)

**231. Biological Nuclear Magnetic Resonance (3)** Lecture—3 hours. Prerequisite: Molecular and Cellular Biology 221A or the equivalent or consent of instructor. Principles and applications of magnetic resonance in biomedicine. Fundamental concepts and the biological magnetic resonance applications in areas of tissue characterization/ imaging, metabolic regulation, and cellular bioenergetics. (Same course as Biological Chemistry 231.) Offered in alternate years. —S. (S.) Jue

**241. Membrane Biology (3)** Lecture—3 hours. Prerequisite: Biological Sciences 102, 103, 104 or consent of instructor. Advanced topics on membrane biochemistry and biophysics. Relationships of the unique properties of biomembranes to their roles in cell biology and physiology. (Same course as Molecular and Cellular Biology 241.)—S. (S.) Crowe, Longo, Voss

**255. Biophotonics in Medicine and the Life Sciences (3)** Lecture/discussion—3 hours. Prerequisite: Physics 108 and Biology 101-105; Biomedical Engineering 202 highly recommended; graduate standing. Introduction to the science and technology of biomedical optics and photonics, with an overview of applications in medicine and the life sciences. Emphasis on research supported by the NSF Center for Biophotonics at UC Davis Medical Center. (Same course as Applied Science 235 and Biomedical Engineering 235.)—W. (W.) Chuang, Mathews/Leung

**271. Optical Methods in Biophysics (4)** Lecture—3 hours; discussion/laboratory—1 hour. Prerequisite: Biological Sciences 102 or the equivalent, Applied Science Engineering 108B or the equivalent, Chemistry 110A or the equivalent. Principal optical techniques used to study biological structures and their related functions. Specific optical techniques useful in the studies of protein-nucleic acid, protein-membrane and protein-protein interactions. Biomedical applications of optical techniques. (Same course as Applied Science Engineering 271.)—S. (S.) Huser, Parikh, Yeh

**290. Biophysics Seminar (1)** Seminar—1 hour. Prerequisite: graduate standing or consent of instructor. Presentation of current research by experts in biophysics. May be repeated for credit. (S/U grading only.)—F. W. S. (F, W, S.)

**290C. Research Conference in Biophysics (1)** Seminar—1 hour. Presentation and discussion of faculty and graduate student research in biophysics. May be repeated for credit. (S/U grading only.)—F. W. S. (F, W, S.)

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

**299. Research (1-12)** (S/U grading only)

**Biostatistics (A Graduate Group)**

Bruce Rannala, Ph.D. (Evolution and Ecology), Chairperson of the Group

**Group Office.** 4118 Mathematical Sciences Building 530-692-5194; biostat.ucdavis.edu/

**Faculty**

Sharif Aly, Ph.D., Assistant Professor (Population Health & Reproduction)
Rahman Azari, Ph.D., Lecturer (Statistics)
Hosang Bang, Ph.D., Associate Professor (Public Health Sciences)
Laurel Beckett, Ph.D., Professor (Public Health Sciences)
Prabir Burman, Ph.D., Professor (Statistics)
Kwijon Choi, Ph.D., Assistant Professor (Statistics)
Andrew J. Clifford, Ph.D., Professor (Biostatistics)
Thomas B. Farver, Ph.D., Professor (Population Health and Reproduction)
Emilio Ferrer, Ph.D., Associate Professor (Psychology)
Valerii Filkov, Ph.D., Associate Professor (Computer Science)
Danielle Harvey, Ph.D., Associate Professor (Public Health Sciences)
Fushing Hsieh, Ph.D., Professor (Statistics)
Anna-Maria Iosif, Ph.D., Assistant Professor (Public Health Sciences)
Jiming Jiang, Ph.D., Professor (Statistics)
Philip H. Kass, Ph.D., Professor (Population Health and Reproduction)
Kyoungmi Kim, Ph.D., Assistant Professor (Public Health Sciences)
Ian Korf, Ph.D., Assistant Professor (Evolution and Ecology)
Brian Lee, Ph.D., Professor (Statistics)
Chong-Shan Li, Ph.D., Assistant Professor (Public Health Sciences)