Department of Developmental and Cell Biology

Kavita Arora, Department Chair
Lee Bardwell, Department Vice Chair
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Research programs of the Department of Developmental and Cell Biology focus on molecular aspects of the development of eukaryotic organisms, on the molecular interaction of cells in tissue differentiation, and expression and function of genes related to the biogenesis of organelles and cellular constituents. The main emphasis of research training is in the molecular aspects of cells and development, and the utilization of biotechnology. The Department maintains facilities for research that include genetic, molecular, and biochemical techniques and also has facilities in advanced electron optics, microsurgery, microinjection, and neurophysiology.

- Developmental and Cell Biology, B.S.
- Genetics, B.S.

Graduate Program

The Department offers graduate study in conjunction with the program in Cellular and Molecular Biosciences (CMB), the Interdepartmental Neuroscience Program (INP), and the program in Mathematical and Computational Biology (MCB).

Students admitted into the combined program who select a research advisor in the Department begin following the Departmental requirements for the Ph.D. at the beginning of their second year. Students participate in the Developmental and Cell Biology Journal Club and the Departmental seminar series, which meet weekly during the academic year.

Students must complete the advancement-to-candidacy examination by the end of the third year of graduate study by presenting and defending a proposal for specific dissertation research. The normative time for completion of the Ph.D. is five years, and the maximum time permitted is seven years.

Faculty

Lauren Albrecht, Ph.D. Northwestern University, *Assistant Professor of Pharmaceutical Sciences; Developmental and Cell Biology*

Joseph Arditti, Ph.D. University of Southern California, *Professor Emeritus of Developmental and Cell Biology* (developmental physiology of orchids)

Kavita Arora, Ph.D. University of Bombay, *Department Chair and Professor of Developmental and Cell Biology* (Drosophila development; TGF-ß signal transduction; cell signaling)

Scott Atwood, Ph.D. University of Oregon, *Assistant Professor of Developmental and Cell Biology*

Lee Bardwell, Ph.D. Stanford University, *Professor of Developmental and Cell Biology* (intracellular signaling in development and disease)

Claudia Benavente, Ph.D. University of Arizona, *Associate Professor of Pharmaceutical Sciences; Developmental and Cell Biology* (genetics, epigenetics, cancer, pediatric cancer, retinoblastoma, osteosarcoma)

Bruce Blumberg, Ph.D. University of California, Los Angeles, *Professor of Developmental and Cell Biology; Biomedical Engineering; Environmental Health Sciences; Pharmaceutical Sciences* (gene regulation by nuclear hormone receptors in vertebrate development physiology, endocrine disruption)

Hans R. Bode, Ph.D. Yale University, *Professor Emeritus of Developmental and Cell Biology* (molecular basis of pattern formation in Hydra)

Peter J. Bryant, Ph.D. University of Sussex, *Research Professor and Professor Emeritus of Developmental and Cell Biology* (tumor-suppressor genes of Drosophila and humans)

Susan V. Bryant, Ph.D. University of London, *Professor Emerita of Developmental and Cell Biology* (molecular basis of limb development and regeneration)

Anne L. Calof, Ph.D. University of California, San Francisco, *Professor of Anatomy and Neurobiology; Developmental and Cell Biology*

Richard D. Campbell, Ph.D. The Rockefeller University, *Professor Emeritus of Developmental and Cell Biology* (Morphogenesis; biology of Hydra; fractal geometry of biological forms)

Ken W. Cho, Ph.D. University of Pennsylvania, *Professor of Developmental and Cell Biology* (TGF-ß signaling, gene regulatory networks in development)

Olivier Cinquin, Ph.D. University College London, *Associate Professor of Developmental and Cell Biology* (mathematical modeling of networks, systems biology)

Olivier Civelli, Ph.D. Swiss Federal Institute of Technology in Zurich, *Distinguished Professor of Pharmaceutical Sciences; Developmental and Cell Biology* (novel neuroactive molecules, molecular neuropharmacology)

Michelle Digman, Ph.D. University of Illinois at Chicago, *Associate Professor of Biomedical Engineering; Developmental and Cell Biology* (biophotonics, fluorescence Spectroscopy and microscopy, nano-scale imaging, mechanotransduction, cancer cell migration, fluorescence lifetime and metabolic mapping)

Fangyuan Ding, Ph.D. École Normale Supérieure de Paris, *Assistant Professor of Biomedical Engineering; Developmental and Cell Biology; Pharmaceutical Sciences* (quantitative single molecule biology and engineering, systems biology, nucleic-acid based therapies, single cell research tool developments)

Peter J. Donovan, Ph.D. University College London, *Professor of Biological Chemistry; Developmental and Cell Biology*

Aimee Lara Edinger, Ph.D. University of Pennsylvania, *Professor of Developmental and Cell Biology* (cancer biology and metabolism, growth control, protein trafficking)

German A. Enciso Ruiz, Ph.D. Rutgers, the State University of New Jersey, *Professor of Mathematics; Developmental and Cell Biology* (applied and computational mathematics, mathematical and computational biology)

Dae Seok Eom, Ph.D. The University of Texas at Austin, *Assistant Professor of Developmental and Cell Biology* (cellular projection mediated long-range cell-to-cell communication)

Donald E. Fosket, Ph.D. University of Idaho, *Professor Emeritus of Developmental and Cell Biology* (regulation of cytoskeleton formation and function)

David M. Gardiner, Ph.D. University of California, San Diego, *Professor Emeritus of Developmental and Cell Biology* (limb development and regeneration)

Enrico Gratton, Ph.D. University of Rome, *Distinguished Professor of Biomedical Engineering; Developmental and Cell Biology; Physics and Astronomy* (design of new fluorescence instruments, protein dynamics, single molecule, fluorescence microscopy, photon migration in tissues)

Steven P. Gross, Ph.D. University of Texas at Austin, *Professor of Developmental and Cell Biology; Physics and Astronomy* (force generation by molecular motors in living cells)

Patrick L. Healey, Ph.D. University of California, Berkeley, *Professor Emeritus of Developmental and Cell Biology* (plant cellular differentiation and morphogenesis, ultrastructure and histochemistry of secretory systems, early reproductive development)

Franz J. Hoffmann, Ph.D. University of Hohenheim, *Professor of Teaching Emeritus of Developmental and Cell Biology* (regeneration of cultured plant cells, somatic cell genetics)

Evgeny Kvon, Ph.D. University of Vienna and Institute of Molecular Pathology (IMP), *Assistant Professor of Developmental and Cell Biology* (transcriptional regulation, mouse genomics, cis-regulatory elements, evo-devo)

Arthur D. Lander, Ph.D. University of California, San Francisco, *Donald Bren Professor and Professor of Developmental and Cell Biology; Biomedical Engineering; Logic and Philosophy of Science* (systems biology of development, pattern formation, growth control)

Pablo Lara Gonzalez, Ph.D. The University of Manchester, *Assistant Professor of Drama* (cell division, development and cancer, genomic editing, CRISPR-Cas9, biochemistry, cell culture and fuorescence microscopy)

Star Lee, Ph.D., *Assistant Professor of Teaching of Developmental and Cell Biology* (culturally responsive pedagogy, biology education)

Shin Lin, Ph.D. University of California, Los Angeles, *Professor Emeritus of Developmental and Cell Biology* (combined use of biochemistry, cell biology, molecular biology, molecular biophysics to study the structure and function of proteins involved in cytoskeletal/contractile functions and signal transduction in muscle and nonmuscle cells)

Ulrike Luderer, M.D., Ph.D. Northwestern University, *Professor of Medicine; Developmental and Cell Biology; Environmental and Occupational Health; Population Health and Disease Prevention*

Grant R. MacGregor, Ph.D. University of Sussex, *Professor of Developmental and Cell Biology* (mouse reproduction, development, homeostasis)

J. Lawrence Marsh, Ph.D. University of Washington, *Professor Emeritus of Developmental and Cell Biology* (mechanisms of neurodegeneration and molecular genetics of development)

Debra K. Mauzy-Melitz, Ph.D. Marquette University, *Assistant Professor of Teaching Emeritus of Developmental and Cell Biology* (role of writing in scientific teaching)

Ronald L. Meyer, Ph.D. California Institute of Technology, *Professor Emeritus of Developmental and Cell Biology* (development of nerve connections, nerve injury, and regeneration)

Edwin S. Monuki, M.D., Ph.D. University of California, San Diego, *Department Chair and Warren L. Bostick Endowed Chair in Pathology and Professor of Pathology and Laboratory Medicine; Developmental and Cell Biology*

Seyed Ali Mortazavi, Ph.D. California Institute of Technology, *Professor of Developmental and Cell Biology; Biological Chemistry; Pharmaceutical Sciences* (functional genomics to study transcriptional regulation in development)

R. Michael Mulligan, Ph.D. Michigan State University, *Professor of Developmental and Cell Biology; Ecology and Evolutionary Biology* (RNA editing in plant mitochondria and chloroplasts)

Qing Nie, Ph.D. Ohio State University, *Director of the NSF-Simons Center for Multiscale Cell Fate Research and Distinguished Professor of Mathematics; Biomedical Engineering; Developmental and Cell Biology* (applied and computational mathematics, mathematical and computational biology)

Diane K. O'Dowd, Ph.D. University of California, San Diego, *Professor of Developmental and Cell Biology; Anatomy and Neurobiology* (regulation of activity in developing and adult nervous systems)

Michael J. Parsons, Ph.D. University of London, *Associate Professor of Developmental and Cell Biology* (development and regeneration of the endocrine pancreas)

Maksim Plikus, Ph.D. University of Southern California, *Professor of Developmental and Cell Biology* (mechanisms of regeneration, stem cell control)

Thomas F. Schilling, Ph.D. University of Oregon, *Department Chair and Professor of Developmental and Cell Biology* (zebrafish development, vertebrate genetics, craniofacial development)

Xiaoyu Shi, Ph.D. University of California, Davis, *Assistant Professor of Chemistry; Biomedical Engineering; Developmental and Cell Biology* (super-resolution microscopy)

Christine Suetterlin, Ph.D. University of Basel, *Professor of Developmental and Cell Biology* (centrosome and cilia regulation, Golgi, host-pathogen interaction)

Sha Sun, Ph.D. University of Chicago, *Assistant Professor of Developmental and Cell Biology* (long noncoding RNAs in epigenetic programming)

Katherine L. Thompson-Peer, Ph.D. Harvard Medical School, *Assistant Professor of Developmental and Cell Biology* (investigating how neurons respond and recover after injury)

Wenqi Wang, Ph.D. Shanghai Institutes for Biological Sciences, *Associate Professor of Developmental and Cell Biology* (the signaling networks underlying tissue homeostasis and organ size control)

Rahul Warrior, Ph.D. Yale University, *Associate Professor of Developmental and Cell Biology* (developmental genetics of transcription and proteoglycan synthesis)

Adrienne Williams, Ph.D. University of California, Irvine, *Assistant Professor of Teaching of Developmental and Cell Biology* (biology education, equity in STEM education, learning assistants)

Xaiohui Xie, Ph.D. Massachusetts Institute of Technology, *Professor of Computer Science; Developmental and Cell Biology* (computational biology, bioinformatics, genomics, neural computation, machine learning)

Courses

DEV BIO 200A. Research in Developmental and Cell Biology. 2-12 Units.
Independent research with Developmental and Cell Biology faculty.

Repeatability: Unlimited as topics vary.

Restriction: Graduate students only.

DEV BIO 200B. Research in Developmental and Cell Biology. 2-12 Units.
Independent research with Developmental and Cell Biology faculty.

Prerequisite: DEV BIO 200A. DEV BIO 200A with a grade of B- or better

Repeatability: Unlimited as topics vary.

Restriction: Graduate students only.

DEV BIO 200C. Research in Developmental and Cell Biology . 2-12 Units.
Independent research with Developmental and Cell Biology faculty.

Prerequisite: DEV BIO 200B. DEV BIO 200B with a grade of B- or better

Repeatability: Unlimited as topics vary.

Restriction: Graduate students only.

DEV BIO 200R. Research in Developmental & Cell Biology for First-year Students. 2-12 Units.
Independent research within the laboratories of graduate training faculty in the Department of Developmental and Cell Biology for first-year Ph.D. students.

Grading Option: Satisfactory/unsatisfactory only.

Repeatability: May be taken for credit 3 times.

DEV BIO 203A. Graduate Tutorial in Developmental and Cell Biology. 4 Units.
Advanced study in areas not represented by formal courses. May involve individual or small group study through discussion, reading, and composition. Time and subject matter arranged individually.

Repeatability: Unlimited as topics vary.

Restriction: Graduate students only.

DEV BIO 203B. Graduate Tutorial in Developmental and Cell Biology. 4 Units.
Advanced study in areas not represented by formal courses. May involve individual or small group study through discussion, reading, and composition. Time and subject matter arranged individually.

Prerequisite: DEV BIO 203A. DEV BIO 203A with a grade of B- or better

Repeatability: Unlimited as topics vary.

Restriction: Graduate students only.

DEV BIO 203C. Graduate Tutorial in Developmental and Cell Biology. 4 Units.
Advanced study in areas not represented by formal courses. May involve individual or small group study through discussion, reading, and composition. Time and subject matter arranged individually.

Prerequisite: DEV BIO 203B. DEV BIO 203B with a grade of B- or better

Repeatability: Unlimited as topics vary.

Restriction: Graduate students only.

DEV BIO 206A. Developmental and Cell Biology Journal Club. 2 Units.
Advanced study of various topics in cell biology.

Grading Option: Satisfactory/unsatisfactory only.

Repeatability: May be repeated for credit unlimited times.

DEV BIO 206B. Developmental and Cell Biology Journal Club. 2 Units.
Advanced study of various topics in cell biology.

Prerequisite: DEV BIO 206A. DEV BIO 206A with a grade of B- or better

Grading Option: Satisfactory/unsatisfactory only.

Repeatability: May be repeated for credit unlimited times.

DEV BIO 206C. Developmental and Cell Biology Journal Club. 2 Units.
Advanced study of various topics in cell biology.

Prerequisite: DEV BIO 206B. DEV BIO 206B with a grade of B- or better

Grading Option: Satisfactory/unsatisfactory only.

Repeatability: May be repeated for credit unlimited times.

DEV BIO 207. Mouse Developmental Genetics. 4 Units.
Introduction to using the mouse in contemporary biomedical research. The biology and development of the laboratory mouse, methods for manipulation of the mouse genome and embryos, and examples of application of these methods to understand mammalian development and homeostasis.

Same as BIOCHEM 215.

Restriction: Graduate students only.

DEV BIO 210. Developmental Genetics and Genomics. 4 Units.
Focuses on critical concepts in developmental genetics and genomics, emphasizing primary literature and new cutting edge approaches in genetic model organisms such as worms, flies, fish, and mice, with relevance for human genetics and disease.

Repeatability: May be taken for credit 2 times.

Restriction: Graduate students only.

DEV BIO 212. Topics in Systems Biology. 2 Units.
Studies in selected areas of Systems Biology.

Grading Option: Satisfactory/unsatisfactory only.

Repeatability: May be repeated for credit unlimited times.

Restriction: Graduate students only.

DEV BIO 212A. Data Science Topics in Systems Biology. 2 Units.
A journal club examining data science and machine learning applications in systems biology.

Grading Option: Satisfactory/unsatisfactory only.

Repeatability: May be repeated for credit unlimited times.

Restriction: Graduate students only.

DEV BIO 214. Principles of Genomics. 4 Units.
A survey course of the principal subfields of genomics and their applications to biological and health sciences that will cover genome assembly and annotation, genome structure, comparative genomics, population genomics, functional genomics, and medical genomics.

Same as MOL BIO 244.

Restriction: Graduate students only.

DEV BIO 231B. Cell Biology. 4 Units.
A broadly based course including topics in extracellular matrix, cytoskeleton, organelle biogenesis, receptor-mediated endocytosis, signal transduction, cell cycle, and developmental biology.

Concurrent with BIO SCI D154.

DEV BIO 232. Systems Cell and Developmental Biology. 4 Units.
Introduces concepts needed to understand cell and developmental biology at the systems level, i.e., how the parts (molecules) work together to create a complex output. Emphasis on using mathematical/computational modeling to expand/modify insights provided by intuition.

Same as BME 213.

Restriction: Graduate students only.

DEV BIO 245. Stem Cell Biology. 4 Units.
The basic characteristics and development roles of embryonic, adult, and cancer stem cells in the human body and in model systems and the use of experimental and genetic methods to analyze and manipulate their properties.

Restriction: Graduate students only.

DEV BIO 290A. Colloquium in Developmental and Cell Biology. 2 Units.
Contemporary research problems. Research students, faculty, and other invited speakers introduce research and review topics.

Restriction: Graduate students only.

DEV BIO 290B. Colloquium in Developmental and Cell Biology. 2 Units.
Contemporary research problems. Research students, faculty, and other invited speakers introduce research and review topics.

Prerequisite: DEV BIO 290A. DEV BIO 290A with a grade of B- or better

Restriction: Graduate students only.

DEV BIO 290C. Colloquium in Developmental and Cell Biology. 2 Units.
Contemporary research problems. Research students, faculty, and other invited speakers introduce research and review topics.

Prerequisite: DEV BIO 290B. DEV BIO 290B with a grade of B- or better

Restriction: Graduate students only.

DEV BIO 292A. Scientific Communication. 2 Units.
Small group meetings for graduate students to practice scientific writing, debate, and presentation skills.

Grading Option: Satisfactory/unsatisfactory only.

Repeatability: May be repeated for credit unlimited times.

DEV BIO 292B. Scientific Communication. 2 Units.
Small group meetings for graduate students to practice scientific writing, debate, and presentation skills.

Prerequisite: DEV BIO 292A. DEV BIO 292A with a grade of B- or better

Grading Option: Satisfactory/unsatisfactory only.

Repeatability: May be repeated for credit unlimited times.

DEV BIO 292C. Scientific Communication. 2 Units.
Small group meetings for graduate students to practice scientific writing, debate, and presentation skills.

Prerequisite: DEV BIO 292B. DEV BIO 292B with a grade of B- or better

Grading Option: Satisfactory/unsatisfactory only.

Repeatability: May be repeated for credit unlimited times.

DEV BIO 399. University Teaching. 4 Units.
Limited to Teaching Assistants.

Grading Option: Satisfactory/unsatisfactory only.

Repeatability: May be repeated for credit unlimited times.

Restriction: Graduate students only.