Overview

The Department of Biological Chemistry provides advanced training to individuals who are interested in understanding the fine regulation of the biological processes, structural basis of the regulation, and the identification of targets for disease managements. Faculty research interests are diverse with emphases on several areas of basic and translational research: epigenetic regulation of gene expression; circadian rhythm and metabolism; chromatin structure and function; DNA repair and DNA damage responses; telomerase and telomere regulation; ubiquitin regulation in metabolism and cell cycle; signal transduction and transcription regulation in development and disease manifestation; molecular mechanisms of stem cell regulation and tumorigenesis; genomic and bioinformatics. Students are trained and exposed to technical expertise in all facets of current biological sciences. Established core research facilities are available in which students have access to a microarray and high-throughput sequencing core facility, electron microscopy, atomic force microscopy, confocal imaging center, mass spectroscopy, flow cytometry, transgenic core laboratories, biopolymer sequencing and synthesis laboratories, and other resources.

The Department offers training to graduate students under the auspices of the School of Medicine and in conjunction with the gateway program in Cellular and Molecular Biosciences (CMB) as well as the Mathematical, Computational, and Systems Biology (MCSB) program. Students are eligible to enter the Department program after meeting the specific requirements of the CMB gateway curriculum or by direct application to the Department. The Department program leads to the M.S. or Ph.D. in Biomedical Sciences, awarded after successful completion of all requirements. Students admitted into the combined program who select a research advisor in the Department begin thesis research in the second year. Students are required to attend and participate in the departmental research seminars. In addition, students are required to complete two advanced-level graduate courses subsequent to entering the Department’s Ph.D. concentration. In the third year, students take the advancement-to-candidacy examination for the Ph.D. by presenting and defending a proposal for specific dissertation research. The normative time for completion of the Ph.D. is five years; students who make exceptional progress on their thesis projects are encouraged to complete the Ph.D. sooner. The maximum time permitted is seven years.

Faculty

Bogi Andersen, M.D. University of Iceland, Professor of Medicine; Biological Chemistry
Pierre F. Baldi, Ph.D. California Institute of Technology, Director of Institute for Genomics and Bioinformatics and Distinguished Professor of Computer Science; Biological Chemistry; Biomedical Engineering; Developmental and Cell Biology; Mathematics (artificial intelligence and machine learning, biomedical informatics, databases and data mining, environmental informatics, statistics and statistical theory)
Rémi Buisson, Ph.D. Université Laval, Assistant Professor of Biological Chemistry
Phang-Lang Chen, Ph.D. University of California, San Diego, Associate Professor of Biological Chemistry
Xing Dai, Ph.D. University of Chicago, Professor of Biological Chemistry
Peter J. Donovan, Ph.D. University College London, Professor of Biological Chemistry; Developmental and Cell Biology
Angela G. Fleischman, M.D. Stanford University, Assistant Professor of Medicine; Biological Chemistry
Anand K. Ganesan, M.D. Medical College of Wisconsin, Associate Professor of Dermatology; Biological Chemistry
Sergei A. Grando, M.D., Ph.D., D.Sc. Central Institute of Dermatology and Venereology, Professor of Dermatology; Biological Chemistry
Lan Huang, Ph.D. University of Florida, Professor of Physiology and Biophysics; Biological Chemistry; Biomedical Engineering; Pharmaceutical Sciences
Peter Kaiser, Ph.D. University of Innsbruck, Department Chair and Professor of Biological Chemistry
Kai Kessenbrock, Ph.D. Ludwig Maximilian University of Munich, Assistant Professor of Biological Chemistry
Eva Y. Lee, Ph.D. University of California, Berkeley, UCI Chancellor’s Professor Emerita of Biological Chemistry
Wen-Hwa Lee, Ph.D. University of California, Berkeley, Professor Emeritus of Biological Chemistry
Ellis Levin, M.D. Thomas Jefferson University, Jefferson Medical College, Professor in Residence of Medicine; Biological Chemistry
Biological Chemistry

Haoping Liu, Ph.D. Cornell University, Professor of Biological Chemistry
Selma Masri, Ph.D. Beckman Research Institute of the City of Hope, Assistant Professor of Biological Chemistry
Frank L. Meyskens, M.D. University of California, San Francisco, Daniel G. Aldrich, Jr. Endowed Chair and Professor of Medicine; Biological Chemistry; Program in Public Health
Seyed Ali Mortazavi, Ph.D. California Institute of Technology, Assistant Professor of Developmental and Cell Biology; Biological Chemistry (functional genomics to study transcriptional regulation in development)
Daniele Piomelli, Ph.D. Columbia University, Louise Turner Arnold Chair in the Neurosciences and Distinguished Professor of Anatomy and Neurobiology; Biological Chemistry; Pharmacology
Feng Qiao, Ph.D. University of California, Los Angeles, Associate Professor of Biological Chemistry

Suzanne B. Sandmeyer, Ph.D. University of Washington, Vice Dean for Research and Grace Beekhuis Bell Chair in Biological Chemistry and Professor of Biological Chemistry; Microbiology and Molecular Genetics
Paolo Sassone-Corsi, Ph.D. University of Naples Federico II, Donald Bren Professor and Distinguished Professor of Biological Chemistry; Microbiology and Molecular Genetics; Pharmaceutical Sciences; Pharmacology

Robert E. Steele, Ph.D. Yale University, Professor of Biological Chemistry
Leslie M. Thompson, Ph.D. University of California, Irvine, Professor of Psychiatry and Human Behavior; Biological Chemistry; Neurobiology and Behavior
Richard A. Van Etten, M.D. Stanford University, Professor of Medicine; Biological Chemistry
Kyoko Yokomori, Ph.D. University of Tokyo, Professor of Biological Chemistry

Michael V. Zaragoza, M.D., Ph.D. Case Western Reserve University, Assistant Professor of Pediatrics; Biological Chemistry; Genetic Counseling

Courses

**BIOCHEM 200A. Research in Biological Chemistry. 2-12 Units.**
Individual research under the supervision of a professor.
Repeatability: Unlimited as topics vary.

**BIOCHEM 200B. Research in Biological Chemistry. 2-12 Units.**
Individual research under the supervision of a professor.
Repeatability: Unlimited as topics vary.

**BIOCHEM 200C. Research in Biological Chemistry. 2-12 Units.**
Individual research under the supervision of a professor.
Repeatability: Unlimited as topics vary.

**BIOCHEM 200R. Research in Biological Chemistry for First-Year Students. 2-12 Units.**
Independent research within the laboratories of graduate training faculty in the Department of Biological Chemistry for first-year Ph.D. students.
Grading Option: Satisfactory/unsatisfactory only.
Repeatability: May be taken for credit 3 times.

**BIOCHEM 202A. Laboratory Seminar Series. 1 Unit.**
Study within a laboratory group including research and journal presentations.
Grading Option: Satisfactory/unsatisfactory only.
Repeatability: Unlimited as topics vary.

**BIOCHEM 202B. Laboratory Seminar Series. 1 Unit.**
Study within a laboratory group including research and journal presentations.
Grading Option: Satisfactory/unsatisfactory only.
Repeatability: Unlimited as topics vary.
BIOCHEM 202C. Laboratory Seminar Series. 1 Unit.
Study within a laboratory group including research and journal presentations.
Grading Option: Satisfactory/unsatisfactory only.
Repeatability: Unlimited as topics vary.

BIOCHEM 207. Advanced Molecular Genetics. 4 Units.
Literature-based discussion of molecular principles in genetics and functional genomics, with focus on cancer and stem cell biology.
Repeatability: May be taken for credit 2 times.

BIOCHEM 210A. Medical Biochemistry and Molecular Biology. 12 Units.
Covers the following topics from a biomedical perspective: protein and nucleic acid biochemistry, carbohydrates, lipids, amino acids, purines and pyrimidines, genome structure, molecular mechanisms of development, and signal transduction.
Restriction: Graduate students only.

BIOCHEM 215. 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 DEV BIO 207.
Restriction: Graduate students only.

BIOCHEM 217. Human Evolution and Behavior. 4 Units.
Covers theories and empirical research concerning the evolutionary origins of human behaviors and their variations. An interdisciplinary course emphasizing both evolutionary psychology (e.g., mating strategies, kinship, and parenting) and molecular evolution (i.e., evolution of genes for various behaviors).
Same as PSCI P271.
Restriction: Graduate students only.

BIOCHEM 225. Epigenetics in Health and Disease. 4 Units.
Focuses on the role of chromatin/nuclear structure organization (histone and DNA modification, chromatin remodeling, higher order chromatin structure and nuclear organization) on gene regulation, DNA replication and repair, relevant to development, metabolism, learning and memory, and human disease.
Prerequisite: MOL BIO 203 or MOL BIO 204 or NEURBIO 206
Same as NEURBIO 230.
Restriction: Graduate students only.

BIOCHEM 240. New Breakthroughs in Basic and Translational Cancer Research. 4 Units.
Highlights breakthroughs in molecular and cellular aspects of cancer biology and emerging therapeutic approaches. Emphasis on new discoveries of critical pathways/processes in cancer etiology, progression, and metastasis. Introduces strategies used in the discovery, design of biological and small molecules-based therapies.
Prerequisite: MOL BIO 204 or PHYSIO 252. A gene regulation course is also required.
Restriction: Graduate students only.

BIOCHEM 291. Research Seminar. 2 Units.
Student research-based colloquium covering current topics in gene organization and expression, cell cycle and differentiation, DNA repair, checkpoint control, and the physical, chemical, and biological properties of macromolecules. Students are encouraged to read critically and analyze recent literature.
Grading Option: Satisfactory/unsatisfactory only.
Repeatability: May be repeated for credit unlimited times.
Restriction: Graduate students only.
**BIOCHEM 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.

**BIOCHEM 292B. 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.

**BIOCHEM 292C. 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.