

# Biological Chemistry

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**Peter Kaiser, Department Chair**

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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 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; Dermatology*

Pierre F. Baldi, Ph.D. California Institute of Technology, *Director of the Institute for Genomics and Bioinformatics and Distinguished Professor of Computer Science; Biological Chemistry; Biomedical Engineering; 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; Pharmaceutical Sciences*

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; Dermatology*

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., Ph.D. Medical College of Wisconsin, *Professor of Dermatology; Biological Chemistry*

Sergei A. Grando, M.D., Ph.D., D.Sc. Medical Institute, Kiev in Ukraine; PostGraduate Institute for Physicians in Kiev; Central Institute of Dermatology and Venerology in Moscow, *Professor of Dermatology; Biological Chemistry*

Lan Huang, Ph.D. University of Florida, *Professor of Physiology and Biophysics; Biological Chemistry; Biomedical Engineering; Pharmaceutical Sciences* (proteomics, mass spectrometry, structural biology, chemical biology, proteasome biology, protein-protein interactions, protein complexes)

Cholsoon Jang, Ph.D. Harvard University, *Assistant Professor of Biological Chemistry*

Peter Kaiser, Ph.D. University of Innsbruck, *Department Chair and Professor of Biological Chemistry*

Kai Kessenbrock, Ph.D. Ludwig Maximilian University of Munich, *Associate Professor of Biological Chemistry*

Albert R. La Spada, M.D., Ph.D. University of Pennsylvania, *Associate Dean for Research Development and Distinguished Professor of Biological Chemistry; Neurobiology and Behavior; Neurology; Pathology and Laboratory Medicine*

Eva Y. Lee, Ph.D. University of California, Berkeley, *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*

Wei Li, Ph.D. Institute of Biophysics, Chinese Academy of Sciences, *Professor of Biological Chemistry*

Haoping Liu, Ph.D. Cornell University, *Professor of Biological Chemistry; Pharmaceutical Sciences*

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 Distinguished Professor Emeritus of Medicine; Biological Chemistry*

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)

Trina M. Norden-Krichmar, Ph.D. University of California, San Diego, *Associate Professor of Epidemiology and Biostatistics; Biological Chemistry; Computer Science; Pharmaceutical Sciences*

Nicholas R. Pannunzio, Ph.D. Beckman Research Institute of City of Hope, *Assistant Professor of Medicine; Biological Chemistry*

Daniele Piomelli, Ph.D. Columbia University, *Louise Turner Arnold Endowed Chair in the Neurosciences and Distinguished Professor of Anatomy and Neurobiology; Biological Chemistry; Pharmaceutical Sciences*

Feng Qiao, Ph.D. University of California, Los Angeles, *Associate Professor of Biological Chemistry*

Suzanne B. Sandmeyer, Ph.D. University of Washington, *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*

Marcus M. Seldin, Ph.D. Johns Hopkins University, *Assistant Professor of Biological Chemistry*

Robert E. Steele, Ph.D. Yale University, *Professor of Biological Chemistry*

Leslie M. Thompson, Ph.D. University of California, Irvine, *Chancellor's Professor and Donald Bren Professor of Psychiatry and Human Behavior; Biological Chemistry; Neurobiology and Behavior*

Richard A. Van Etten, M.D., Ph.D. Stanford University, *Director, Chao Family Comprehensive Cancer Center; Chao Family Endowed Director's Chair in Cancer Research and Treatment and Senior Associate Dean and Associate Vice Chancellor for Cancer and Professor of Medicine; Biological Chemistry*

Kyoko Yokomori, Ph.D. University of Tokyo, *Associate Dean of Academic Affairs - Senate and Professor of Biological Chemistry*

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

Weian Zhao, Ph.D. McMaster University, *Professor of Pharmaceutical Sciences; Biological Chemistry; Biomedical Engineering; Chemical and Biomolecular Engineering* (stem cell therapy, diagnostics, biosensors, immunotherapy, single-cell analysis)

## 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. Current Topics in Cancer Genomics. 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. MOL BIO 203 with a grade of B- or better. MOL BIO 204 with a grade of B- or better. NEURBIO 206 with a grade of B- or better

Same as NEURBIO 230.

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.