CHEMICAL AND SYSTEMS BIOLOGY

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Courses given in Chemical and Systems Biology have the subject code CSB. For a complete list of subject codes, see Appendix.

In Autumn of 2006, the Department of Molecular Pharmacology changed its name to become the Department of Chemical and Systems Biology. The department has established a new Ph.D. program in Chemical and Systems Biology. Molecular Pharmacology Ph.D. students who enrolled prior to Autumn 2007 have the option of receiving their Ph.D. in either Molecular Pharmacology or Chemical and Systems Biology. Ph.D. students matriculating in Autumn 2007 and thereafter are admitted to Chemical and Systems Biology. Further details about degree requirements are available from the department.

GRADUATE PROGRAMS

MASTER OF SCIENCE

Students in the Ph.D. program may apply for an M.S. degree after having satisfactorily completed the course and laboratory requirements of the first two years. The degree also requires a written thesis based on literature or laboratory research. Postdoctoral research training is available to graduates having the Ph.D. or M.D. degree.

DOCTOR OF PHILOSOPHY

University requirements for the Ph.D. are described in the "Graduate Degrees" section of this bulletin.

The Department of Chemical and Systems Biology offers interdisciplinary training to prepare students for independent careers in biomedical science. The main focus of the program is cell signaling, chemical biology, and systems biology.

The program leading to the Ph.D. degree includes formal and informal study in chemical biology, systems biology, drug discovery, biochemistry, and other areas of relevance to the interests of particular students. First-year students spend one quarter in each of three different laboratories, working closely with other graduate students, a professor, and postdoctoral fellows on various research projects. During the fourth quarter, the student chooses a faculty mentor with whom to undertake thesis research, based on available positions and the student's interest. During or before the eighth quarter of study, students must pass a qualifying exam which consists of an oral exam on general knowledge and a defense of a research proposal. Course requirements are fulfilled during the first two years of study; the later years of the four- to six-year program are devoted to full-time dissertation research. Close tutorial contact between students and faculty is stressed throughout the program.

Research opportunities also exist for medical students and undergraduates. The limited size of the labs in the department allows for close tutorial contact between students, postdoctoral fellows, and faculty.

The department participates in the four quarter Health and Human Disease sequence which provides medical students with a comprehensive, systems-based education in physiology, pathology, microbiology, and pharmacology.

COURSES

Course and lab instruction in the Department of Chemical and Systems Biology conforms to the "Policy on the Use of Vertebrate Animals in Teaching Activities," the text of which is available at http://www.stanford.edu/dept/DoR/rph/8-2.html.

Open to all University students; consent of instructor required prior to registration. Students should consult with the instructor about the adequacy of their preparation.

CSB 199. Undergraduate Research—Investigations sponsored by individual faculty members. Prerequisite: consent of instructor.
1-18 units, Aut, Win, Spr, Sum (Staff)

CSB 210. Signal Transduction Pathways and Networks—The molecular mechanisms through which cells receive and respond to external signals. Emphasis is on principles of cell signaling, the systems-level properties of signal transduction modules, and experimental strategies through which cell signaling pathways are being studied. Prerequisite: working knowledge of biochemistry and genetics.
4 units, Win (Ferrell, J; Meyer, T)

CSB 220. Chemistry of Biological Processes—(Same as BIOC 220.) The principles of organic and physical chemistry as applied to biomolecules. Goal is a working knowledge of chemical principles that underlie biological processes, and chemical tools used to study and manipulate biological systems. Prerequisites: organic chemistry and biochemistry, or consent of instructor.
4 units, Aut (Herschlag, D; Chen, J; Bogyo, M; Wandless, T)
alternate years, not given next year

CSB 240. Drug Discovery—The scientific principles and technologies involved in making the transition from a basic biological observation to the creation of a new drug emphasizing molecular and genetic issues. Prerequisite: biochemistry, chemistry, or bioengineering.
4 units, alternate years, not given this year

CSB 260. Quantitative Chemical Biology—Current topics including protein and small molecule engineering, cell signaling sensors and modulators, molecular imaging, chemical genetics, combinatorial chemistry, in vitro evolution, and signaling network modeling. Prerequisites: undergraduate organic chemistry, and biochemistry or cell biology.
4 units, Spr (Chen, J), alternate years, not given next year

CSB 270. Research Seminar—Guest speakers and discussion on current research in pharmacology.
1-2 units, not given this year (Staff)

CSB 278. Introduction to Systems Biology—(Same as CS 278.) For biologists, engineers, and computer scientists. Experimental and computational approaches to modeling and analysis of complex biological systems. Topics: biological noise; simple signaling circuits (cascades, feedback, and feed-forward circuits); bistability and oscillations; large scale models; synthetic biology; and analysis of omics-scale data sets. Computational approached include ODE modeling, stochastic simulation, boolean networks, Bayesian approaches, and hybrid modeling.
4 units, Spr (Dill, D; Brutlag, D; Koller, D; Covert, M; Ferrell, J)

CSB 299. Directed Reading in Chemical and Systems Biology—Prerequisite: consent of instructor.
1-18 units, Aut, Win, Spr, Sum (Staff)

CSB 399. Graduate Research—Investigations sponsored by individual faculty members. Prerequisite: consent of instructor.
1-18 units, Aut, Win, Spr, Sum (Staff)