

# MOLECULAR PHARMACOLOGY

*Emeriti: (Professors)* Robert H. Dreisbach, Avram Goldstein, Dora B. Goldstein, Tag E. Mansour

*Chair:* Daria Mochly-Rosen

*Professors:* James E. Ferrell, Jr., Oleg Jardetzky, Daria Mochly-Rosen, Richard A. Roth, James P. Whitlock, Jr.

*Associate Professor:* Tobias Meyer

*Assistant Professor:* James K. Chen, Karlene A. Cimprich, Ricardo Dolmetsch, Thomas J. Wandless

*Consulting Professors:* Gordon Ringold, Alejandro Zaffaroni

*Web Site:* <http://molepharm.stanford.edu>

Courses given in Molecular Pharmacology have the subject code MPHA. For a complete list of subject codes, see Appendix B.

## 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 Molecular Pharmacology offers interdisciplinary training to prepare students for independent careers in biomedical science. Research and training in the department focuses on the mechanisms by which hormones, drugs, and toxic compounds alter cell function, and on the development of new therapeutic technologies. At the heart of these issues lies the analysis of cell signaling and gene expression.

The program leading to the Ph.D. degree includes formal and informal study in pharmacology, genetics, biochemistry, and molecular cell biology. 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 a limited number of undergraduate students. The limited size of the labs in the department allows for close tutorial contact between students, postdoctoral fellows, and faculty.

The department presents two basic courses in medical pharmacology (201 and 202) and advanced courses open to qualified medical and other graduate students. Consult the *Time Schedule* for additional advanced courses.

## COURSES

Course and lab instruction in the Department of Molecular Pharmacology 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>.

### BASIC

201 and 202 provide a broad exposure to the principles of pharmacology and the properties of the major drug groups.

#### MPHA 199. Undergraduate Research

1-18 units, Aut, Win, Spr, Sum (Staff)

**MPHA 201. Pharmacology**—Topics: receptors; pharmacokinetics; and autonomic, CNS, and cardiovascular pharmacology. Emphasis is on the mechanisms of drug action in humans. Prerequisite: biochemistry. 5 units, Aut (Ferrell, Whitlock)

**MPHA 202. Pharmacology**—Continuation of 201. Topics: antimicrobial chemotherapy, cancer chemotherapy, endocrine and GI pharmacology, and toxicology. 5 units, Win (Whitlock)

### ADVANCED

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

**MPHA 210. Signal Transduction Pathways and Networks**—(Same as BIOSCI 210.) 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: a working knowledge of biochemistry and genetics. 4 units, Win (Ferrell, Meyer)

**MPHA 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, with emphasis on molecular and genetic issues. Prerequisite: knowledge of biochemistry, chemistry, or bioengineering. 4 units, Spr (Mochly-Rosen, Cimprich) alternate years, not given 2004-05

**MPHA 250. Fundamentals of Drug-Receptor Interactions and Drug Design**—The principles of biological structure determination, scope, and the limits of the methods and of the structural information derived from them. Enrollment limited to 15. 3 units (Jardetzky) not given 2003-04

**MPHA 260. Quantitative Chemical Biology**—Principles governing chemical and biological processes and recent advances at the interface of chemistry and biology. Topics include protein and small molecule engineering, chemical genetics, combinatorial chemistry, and in vitro evolution. Prerequisites: undergraduate organic chemistry, and biochemistry or cell biology. 4 units (Cimprich, Wandless, Jackson) not given 2003-04

**MPHA 270. Research Seminar**—Current research in pharmacology. Seminars are reviewed and discussed in a separate conference with a member of the faculty. 1-2 units, Aut, Win, Spr (Staff)

**MPHA 280. Tutorial Program**—Guided readings in the literature of any area of pharmacology. Review paper may be required. Primarily for students in pharmacology. See faculty list for section numbers. 1-18 units, Aut, Win, Spr, Sum, by arrangement

**MPHA 299. Directed Reading**—See faculty list for section numbers. 1-18 units, Aut, Win, Spr, Sum, by arrangement

**MPHA 399. Research**—Investigations sponsored by individual faculty members. See faculty list for section numbers. 1-18 units, Aut, Win, Spr, Sum, by arrangement

**MPHA 450. Introduction to Biotechnology**—(Enroll in CHEMENG 450, BIOC 450.) 3 units, Spr (Kao)

**MPHA 459. Frontiers in Interdisciplinary Biosciences**—(Crosslisted in multiple departments in the schools of Humanities and Sciences, Engineering, and Medicine. Students should enroll through their affiliated department; otherwise enroll in CHEMENG 459.) See CHEMENG 459 or [http://biox.stanford.edu/chemeng\\_index.html](http://biox.stanford.edu/chemeng_index.html) for description. 1 unit, Aut, Win, Spr (Robertson)