Pharmacological Sciences

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http://www.pharmsci.uci.edu

The Department of Pharmaceutical Sciences currently offers two graduate programs: the Ph.D. in Pharmacological Sciences and the Master of Science in Pharmacology (MSP).

Ph.D. in Pharmacological Sciences

The Ph.D. in Pharmacological Sciences provides a unique opportunity for students interested in any scientific discipline represented by the Pharmaceutical Sciences faculty to have a year of broad, interdisciplinary training followed by focused doctoral research in the Pharmaceutical Sciences research group of their choice. Students in the program choose one of three concentrations/curriculum paths in Pharmaceutical Sciences, Pharmacology, or Medicinal Chemistry. At the end of their first year of interdisciplinary training, they transition into a research group to begin their more focused doctoral research under the guidance of a Pharmaceutical Sciences faculty member.

For complete information on the Ph.D. in Pharmacological Sciences, visit the Interdisciplinary section of the Catalogue.

Master of Science in Pharmacology (MSP)

The MSP is a two-year, online degree program geared toward teaching students:

• The fundamental principles of pharmacology
• Mechanisms of drug action
• Current topics in drug discovery
• Strategies, techniques and critical thinking skills needed for drug research

The program is designed for working professionals who are interested in advancing in their careers or enhancing their competitiveness for admission to other degree programs.

For complete information on the Master of Science in Pharmacology, click on the Graduate tab above.

M.S. in Pharmacology

The online M.S. in Pharmacology is designed to meet the needs of working professionals and traditional students by providing educational access and flexibility in an online format. It is well-suited to meet the goals of individuals who are seeking leadership positions within their organizations in a variety of fields.

The curriculum emphasizes both theoretical and practical applications and an interdisciplinary approach that serves not only as excellent pathways to career advancement, but also provides a solid foundation from which to pursue doctoral study in related fields.

The M.S. in Pharmacology prepares students for careers in academic research institutions, in the biotechnology and pharmaceutical industry, in federal and state agencies, and in private research institutions.

Admission

The online M.S. in Pharmacology is targeted to working professionals in the pharmaceutical industry and related fields, and is open to any non-traditional student who can benefit from the flexibility and convenience of online learning. Requirements include:

• A bachelor’s degree from a recognized academic institution with degree standards equivalent to UC
• A minimum cumulative undergraduate GPA of 3.0
• One official transcript
• Some coursework in biology is required, but applicants may be admitted with a variety of undergraduate disciplines, including biology, molecular biology, psychology, and chemistry
• Some research experience is required
• Personal statement
• Three letters of recommendation

The priority deadline for applications is March 1.

Requirements

The program consists of 13 required courses (39 units) to be completed sequentially over two years of study (six quarters).
A. Complete the following:

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1 Students take PHARM 270 at the beginning of the first year; it is an accelerated five-day in-residence course offered on the UCI campus.

The capstone paper is written while the student is enrolled in PHARM 280. The student, in consultation with their faculty mentor, selects a topic of interest in pharmacology. The final product will be evaluated by the mentor and the course director for acceptability in meeting the capstone requirement.

Students submit an application for advancement to candidacy in the fifth quarter of study. The capstone research project and required courses for the fifth and sixth quarters must be completed before the degree will be conferred. The normative time to degree is two years.

**Faculty**

James D. Belluzzi, Ph.D. University of Chicago, *Adjunct Professor of Pharmacology*

Emiliana Borrelli, Ph.D. University of Strasbourg, *Chancellor’s Professor of Microbiology and Molecular Genetics; Pharmacology*

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

Sue P. Duckles, Ph.D. University of California, San Francisco, *Professor Emerita of Pharmacology*

Frederick J. Ehler, Ph.D. University of California, Irvine, *Professor of Pharmacology; Anatomy and Neurobiology*

Kelvin W. Gee, Ph.D. University of California, Davis, *Professor of Pharmacology*

Naoto Hoshi, Ph.D. Kanazawa University, *Associate Professor of Pharmacology; Physiology and Biophysics*

Diana N. Krause, Ph.D. University of California, Los Angeles, *Adjunct Professor of Pharmacology*

Frances L. Leslie, Ph.D. University of Aberdeen, *Professor of Pharmacology; Anatomy and Neurobiology*

Shahrdad Lotfipour, Ph.D. University of California, Irvine, *Assistant Professor of Emergency Medicine; Pharmacology*

Zhigang D. Luo, M.D., Ph.D. State University of New York at Buffalo, *Professor of Anesthesiology and Perioperative Care; Pharmacology*

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

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*

Qun-Yong Zhou, Ph.D. Oregon Health & Science University, *Professor of Pharmacology*

Xiaolin Zi, Ph.D. Shanghai University, *Associate Professor of Urology; Pharmacology*

**Courses**

**PHARM 241. Advanced Topics in Pharmacology. 2 Units.**

Application of pharmacological principles in disease therapy. Advanced pharmacological mechanisms and in-depth study of drug action. Discussion of several major drug classes/therapeutic strategies: molecular mechanisms of action, physiological consequences of administration, and clinical use.
PHARM 251. Experimental Pharmacology. 4 Units.
Introduction to the concepts and techniques used in pharmacological science. Molecular biology, quantitative and biochemical pharmacology, fluorescent probes, behavior, genetics, animal handling, anatomical and receptor binding analysis, methods for ion channel study, the absorption, distribution, metabolism and elimination of drugs.

PHARM 254. Introduction to Pharmacology. 4 Units.
Ligand-gated ion channels, G protein-coupled receptors, receptor tyrosine kinases, ligand-regulated transcription factors, their signaling mechanisms, trafficking, macromolecular complexes, and physiological responses.

PHARM 255. Neuropharmacology. 2 Units.
Mechanisms underlying chemical signaling processes in the brain and periphery. Molecular biology, signal transduction, transmitter synthesis, and inactivation of major neurotransmitter systems. Drugs that act on these major neurotransmitters.

Restriction: Graduate students only.

PHARM 256. Experimental Design for Pharmacologists. 1 Unit.
Population and sample statistics, hypothesis testing, analysis of variance, nonparametric statistics, experimental design, power, and the use of statistical computer software.
Prerequisite: PHARM 251

PHARM 257. Ethics in Research. 1 Unit.
Ethical conduct in research including data handling, authorship, conflict of interest, animal rights, handling of misconduct.
Prerequisite: PHARM 299
Repeatability: May be taken for credit 2 times.

PHARM 270. Applied Pharmacology. 3 Units.
One week (five days, 40 hours) in-residence course offered on the UCI campus. Introduction to pharmacological techniques and current research problems; includes laboratory demonstrations and research seminars.
Restriction: Pharmacology Majors only.

PHARM 271. Principles of Pharmacology. 3 Units.
Principles of pharmacology: pharmacodynamics, pharmacokinetics, pharmacogenetics, drug interactions, and toxicity.
Restriction: Pharmacology Majors only.

PHARM 272. Receptors and Drug Targets. 3 Units.
Molecular basis of drug-receptor interaction. Receptor properties including gene and protein structure, signaling mechanisms, trafficking and physiological effects: G-protein linked receptors, ligand-gated ion channels, receptor tyrosine kinases, nuclear receptors, and ligand regulated transcription factors.
Restriction: Pharmacology Majors only.

PHARM 274. Research Techniques in Pharmacology. 3 Units.
Experimental techniques and model systems used in pharmacological research. Receptor analysis, bioassay, molecular biology, in vitro pharmacology, biochemical pharmacology, imaging, electrophysiology, in vivo pharmacology, disease models.
Restriction: Pharmacology Majors only.

PHARM 276. Experimental Design and Data Analysis. 3 Units.
Experimental design, data analysis and interpretation. Population and sample statistics, hypothesis testing, analysis of variance, nonparametric statistics, and power calculations.
Restriction: Pharmacology Majors only.

PHARM 277. Ethics in Scientific Research. 3 Units.
Ethical conduct in research including data handling, authorship, conflict of interest, animal rights, and handling of misconduct.
Restriction: Pharmacology Majors only.
PHARM 278. Concepts in Drug Discovery. 3 Units.
Critical steps involved in discovery and optimization of a new drug. Target selection, relationship of molecular structure to pharmacological activities, screening methods, strategies to identify lead compounds, and preclinical characterization necessary for development of the drug for clinical trials.
Restriction: Pharmacology Majors only.

PHARM 279. Special Topics in Pharmacology. 3 Units.
Topics of current interest in pharmacology; discussion of recent research publications.
Restriction: Pharmacology Majors only.

PHARM 280. Master's Project in Pharmacology. 3 Units.
Capstone research paper on topic of interest in pharmacology.
Restriction: Pharmacology Majors only.

PHARM 281. Neuropharmacology. 3 Units.
Autonomic and central nervous system pharmacology, including major drug classes and therapeutic uses. Mechanisms underlying chemical signaling processes in the brain and peripheral nervous system, including neurotransmitter synthesis, inactivation, and receptor action.
Restriction: Pharmacology Majors only.

PHARM 282. Behavioral Pharmacology. 3 Units.
Restriction: Pharmacology Majors only.

PHARM 283. Cardiovascular Pharmacology. 3 Units.
Basic understanding of drugs used in the prevention and treatment of cardiovascular disease. Mechanisms of action, clinical and adverse effects.
Restriction: Pharmacology Majors only.

PHARM 284. Endocrine, Respiratory, and Gastrointestinal Pharmacology. 3 Units.
Basic understanding of drugs used in endocrine, respiratory, and gastrointestinal conditions, including hormone replacement, contraceptives, and drugs for diabetes, asthma, obesity, ulcer, and gastric reflux. Mechanisms of drug action, clinical and adverse effects.
Restriction: Pharmacology Majors only.

PHARM 298. Seminar. 2 Units.
Presentation and discussion of current problems and methods in teaching and research in pharmacology, toxicology, and therapeutics.
Repeatability: May be repeated for credit unlimited times.
Restriction: Graduate students only.

PHARM 299. Research. 1-12 Units.
Independent research with Pharmacology and Toxicology faculty.
Repeatability: May be repeated for credit unlimited times.
Restriction: Graduate students only.