Pharmacology

Chair
• Curt D. Sigmund

Graduate degrees: M.S. in pharmacology; Ph.D. in pharmacology
Facility: http://www.medicine.uiowa.edu/dept_primary_apr.aspx?appointment=Pharmacology
Web site: http://www.medicine.uiowa.edu/pharmacology/

The Department of Pharmacology provides professional training for health science students and participates with other departments in educational and research activities such as the Medical Scientist Training Program, the Physician Scientist Training Pathway, the Molecular and Cellular Biology Program, the Neuroscience Program, the Holden Comprehensive Cancer Center, the Iowa Cardiovascular Center, and the UI Fraternal Order of Eagles Diabetes Research Center.

The department was a pioneer in offering pharmacology to undergraduate students with little or no science background. Lectures in PCOL:2120 Drugs: Their Nature, Action, and Use emphasize the mechanisms of drug action and give students a background for rational decisions concerning use of drugs.

Pre- and postdoctoral students pursue research training in all areas of pharmacology in the department in preparation for career opportunities in academia, government, and industry.

Graduate Programs of Study
• Master of Science in pharmacology
• Doctor of Philosophy in pharmacology

Department of Pharmacology graduate study includes both didactic and research experience. Qualified students may pursue the joint M.D./Ph.D. in the University’s Medical Scientist Training Program.

Master of Science
The Master of Science program in pharmacology requires a minimum of 30 s.h. of graduate credit. The program requires the following core courses:

PCOL:5135 Principles of Pharmacology 1 s.h.
PCOL:5136 Pharmacogenetics and Pharmacogenomics 1 s.h.
PCOL:5137 Neurotransmitters 1 s.h.
PCOL:6080 Pharmacology Seminar 1 s.h.
PCOL:6090 Graduate Research in Pharmacology arr.
PCOL:6203 Pharmacology for Graduate Students 6 s.h.
BIOC:5243 Biophysical Chemistry Module 1 1 s.h.
BISC:5201 Fundamentals of Gene Expression 1 s.h.
BISC:5203 Fundamentals of Dynamic Cell Processes 1 s.h.
BISC:5204 Biostatistics for Biomedical Research 1 s.h.
MPB:5153 Graduate Physiology 4 s.h.

Students are expected to gain maximum experience in laboratory research while completing their course work. Satisfactory preparation and oral defense of a thesis based on the student’s own research are required for completion of the program.

Doctor of Philosophy
The Doctor of Philosophy program in pharmacology requires a minimum of 72 s.h. of graduate credit. The program requires the following core courses:

PCOL:5135 Principles of Pharmacology 1 s.h.
PCOL:5136 Pharmacogenetics and Pharmacogenomics 1 s.h.
PCOL:5137 Neurotransmitters 1 s.h.
PCOL:6080 Pharmacology Seminar 1 s.h.
PCOL:6203 Pharmacology for Graduate Students 6 s.h.
PCOL:6207 Ion Channel Pharmacology 1 s.h.
PCOL:6208 G Proteins and G Protein-Coupled Receptors 1 s.h.
PCOL:6209 Steroid Receptor Signaling 1 s.h.
PCOL:6250 Advanced Problem Solving in Pharmacological Sciences 1 s.h.
BIOC:5243 Biophysical Chemistry Module 1 1 s.h.
BISC:5201 Fundamentals of Gene Expression 1 s.h.
BISC:5203 Fundamentals of Dynamic Cell Processes 1 s.h.
BISC:5204 Biostatistics for Biomedical Research 1 s.h.
MCB:6225 Growth Factor Receptor Signaling 1 s.h.
MPB:5153 Graduate Physiology 4 s.h.

Individual faculty research advisors may require additional courses.

During the first year of the program, students are required to work in three different faculty laboratories before selecting a laboratory in which to pursue thesis research. Students then are expected to gain maximum laboratory research experience while completing course work. The Ph.D. comprehensive examination (written and oral) is given at the end of the fourth semester. Satisfactory preparation and oral defense of the thesis complete the program.

There is no departmental foreign language requirement.

Admission
Applicants must meet the admission requirements of the Graduate College; see the Manual of Rules and Regulations of the Graduate College. They should have a g.p.a. of at least 3.00 and a combined verbal and quantitative score of at least 312 on the Graduate Record Examination (GRE) General Test. They should have completed undergraduate courses in chemistry, biology, biochemistry, and mathematics.

Admission to the graduate programs is determined by the faculty after receipt of a completed formal application and interview (if appropriate) by faculty members or other designated individuals. Each application is reviewed individually. Some standard admission criteria may be
waived for applicants who possess outstanding credentials in other areas.

**Financial Support**
The department provides all Ph.D. students and some M.S. students with financial support in the form of stipends and tuition support. Support is renewed annually based on satisfactory progress toward meeting degree requirements.

**Courses**

**PCOL:2120 Drugs: Their Nature, Action, and Use**
Principles of drug action, toxicity; sedatives, stimulants, hallucinogens, narcotics, over-the-counter agents, antibiotics, oral contraceptives. Offered spring semesters. Recommendations: closed to Pharm.D. students.

**PCOL:4130 Drug Mechanisms and Actions**
3 s.h.
Introduction to principles of pharmacology, pharmacologic actions of drugs. Offered spring semesters. Requirements: undergraduate biochemistry and physiology courses.

**PCOL:4199 Undergraduate Research in Pharmacology**
arr.
Experimental research under faculty supervision in department laboratories.

**PCOL:5135 Principles of Pharmacology**
1 s.h.
Basic pharmacological principles underlying drug absorption, drug distribution throughout the body, drug metabolism, and drug elimination; how these processes determine drug dosing and the means by which dosing parameters are characterized; drug receptor interactions and their quantitation. Offered spring semesters.

**PCOL:5136 Pharmacogenetics and Pharmacogenomics**
1 s.h.
Impact of genetic variation on the actions and metabolism of drugs; database search techniques to identify variants. Offered spring semesters. Prerequisites: PCOL:5135. Recommendations: undergraduate or graduate biochemistry.

**PCOL:5137 Neurotransmitters**
1 s.h.
Mechanisms of neurotransmission focusing on mechanisms of synthesis, regulation of release, mechanisms of action, means of degradation, and CNS pathways for major neurotransmitters; disease states involving various neurotransmitter systems. Offered spring semesters.

**PCOL:5204 Basic Biostatics and Experimental Design**
1 s.h.
Overview of the theory of experimental design and data analysis in the biological sciences; types of analyses available for common types of data generated in the biomedical sciences; review of statistical methods used in published studies; only a cursory coverage of mathematical computations involved in various analytical tests will be provided.

**PCOL:5204 Basic Biostatics and Experimental Design**
1 s.h.
Overview of the theory of experimental design and data analysis in the biological sciences; types of analyses available for common types of data generated in the biomedical sciences; review of statistical methods used in published studies; only a cursory coverage of mathematical computations involved in various analytical tests will be provided.

**PCOL:6015 Topics in Neuropharmacology**
1 s.h.
Recent advances in neuropharmacology, developmental neurobiology, neuroendocrinology, and related neurosciences. Offered fall semesters.

**PCOL:6020 Topics in Pharmacogenomics**
1 s.h.
Recent advances in pharmacogenomics, pharmacogenetics, and related genetic fields. Offered fall semesters.

**PCOL:6025 Topics in Cell Signaling and Cancer**
1 s.h.
Recent advances in cell signaling mechanisms, mechanisms of cancer, cancer biology, and related sciences.

**PCOL:6030 Topics in Cardiovascular Pharmacology**
1 s.h.
Recent advances in cardiovascular pharmacology, metabolic pharmacology, and related sciences. Offered spring semesters.

**PCOL:6035 Topics in Pain and Analgesia**
1 s.h.
Recent advances in pain research, therapy.

**PCOL:6080 Pharmacology Seminar**
1 s.h.

**PCOL:6090 Graduate Research in Pharmacology**
arr.

**PCOL:6099 Special Topics in Pharmacology**
arr.

**PCOL:6203 Pharmacology for Graduate Students**
6 s.h.
Principles of pharmacology, pharmacologic actions of drugs, correlation with therapeutic uses. Offered fall semesters. Prerequisites: BIOC:5243 and BISC:5201 and BISC:5203 and MPB:5153.

**PCOL:6204 Pharmacology for Health Sciences: Nurse Anesthetist**
5 s.h.
Principles of pharmacology; pharmacologic actions of drugs, correlation with therapeutic uses. Offered fall semesters. Prerequisites: ACB:6000 or NURS:6000. Requirements: enrollment in Anesthesia Nursing Program.

**PCOL:6207 Ion Channel Pharmacology**
1 s.h.
Heuristic, semiquantitative approach to concepts in ion channel physiology and pharmacology; up-to-date physical principles, classification, and structure/function relationships for major voltage-gated ion channels that facilitate application of abstract concepts to physiological, pharmacological, and general biological problems. Offered spring semesters.

**PCOL:6208 G Proteins and G Protein-Coupled Receptors**
1 s.h.
Structure and function of small molecular weight G proteins; heteromeric G proteins and G protein-coupled receptors. Offered spring semesters. Prerequisites: BIOC:5243 and BISC:5201 and BISC:5203. Recommendations: MCB:6225.
PCOL:6209 Steroid Receptor Signaling 1 s.h.
Structure-function relationship and genomic and nongenomic actions of the steroid hormone receptor family; basis for actions of novel new ligands on these receptors. Offered spring semesters. Same as MPB:6209, NSCI:6209.

PCOL:6250 Advanced Problem Solving in Pharmacological Sciences 1 s.h.
Discussion of methodologies, strategies, and approaches commonly used to solve pharmacological sciences problems; use of interpersonal problem-solving skills to develop experimental study plans for solving contemporary scientific problems in pharmacology.

PCOL:8180 Pharmacology for Pharmacy Students I 3 s.h.
Principles of pharmacology, toxicology; drug and toxic mechanisms; systemic and organ-specific pharmacologic and toxic responses. Offered spring semesters. Requirements: first-year Pharm.D. enrollment or graduate standing.

PCOL:8181 Pharmacology for Pharmacy Students II 3 s.h.
Continuation of PCOL:8180. Offered fall semesters. Requirements: second-year Pharm.D. enrollment or graduate standing.

PCOL:8203 Pharmacology for Health Sciences: Medical 5 s.h.
Principles of pharmacology, pharmacologic actions of drugs, correlation with therapeutic uses. Offered fall semesters. Prerequisites: MED:8112. Requirements: M.D. enrollment.

PCOL:8225 Pharmacology for Health Sciences: Physician Assistant Students 6 s.h.
Principles of pharmacology, pharmacologic actions of drugs, correlation with therapeutic uses. Offered fall semesters. Requirements: Physician Assistant Studies and Services enrollment.

PCOL:8240 Basic Pharmacology for Dental Students 3 s.h.
Principles of pharmacology, pharmacologic actions of drugs, correlation with therapeutic uses. Offered spring semesters. Prerequisites: BIOC:8101 and MPB:8115. Requirements: D.D.S. enrollment.