Graduate Study in Pharmacology

The Department of Pharmacology offers programs of study culminating in the Ph.D. and M.S. degrees. Upon successful completion of the chosen program, the individual will be prepared for careers in research and education in the field of pharmacology. Acquiring expertise in the broad field of pharmacology requires an interdisciplinary approach; and therefore, the student may choose to concentrate his or her studies in numerous specialized areas of pharmacology. These areas include:

- Autonomic pharmacology
- Cardiovascular pharmacology
- Cancer pharmacology
- Exocrine pharmacology
- Immunopharmacology
- Neuropharmacology
- Renal pharmacology
- Toxicology

Specific areas of interest include drug-receptor interactions, signal transduction, ion channel function, and molecular and tissue system approaches to studying receptors, signaling and gene function. It is important to note that the interdisciplinary nature of pharmacology offers the student a broad range of options for research endeavors and might include investigations of neurodegenerative diseases, epilepsy, asthma, cancer, teratogenicity of environmental toxins and pharmaceutics, drugs of abuse, and pulmonary hypertension.

Mission Statement

The mission of the Department of Pharmacology graduate programs is to create an intellectually rich environment in which students and trainees are able to develop fully their creative and scientific potential.

Program Goals

The student will carry out the following objectives for completion of the graduate program in pharmacology:

1. Demonstrate an advanced knowledge of pharmacology and a detailed comprehension of the student's specialized field of pharmacology.
2. Illustrate critical and analytical thinking in studying literature, developing hypotheses, executing research, solving scientific problems, and interpreting results.
3. Effectively communicate research results and scientific information in an oral as well as verbal format to both scientific and lay audiences.
4. Demonstrate the ability to independently propose, defend and conduct research in pharmacology for the benefit of science and in the service to others.
5. Display ethical behavior with regard to professional conduct.
6. Exhibit skills that will educate and train others in the field of pharmacology.

Admission Requirements

1. The applicant must possess a baccalaureate degree from an accredited college or university.
3. Undergraduate courses in biology, general chemistry, organic chemistry, biochemistry, and mathematics or equivalent courses are required. Isolated deficiencies may be made up in the graduate program.
4. The Graduate Record Examination (GRE) General Test must be taken. GRE scores for the verbal and quantitative exam sections must be in the 50th percentile or above.
5. The Graduate School requires all students from countries in which English is not the native language to demonstrate competence in English by a score of 90 on the TOEFL (Test of English as a Foreign Language) Internet-based Test (iBT) at the graduate level.

The deadline for applications to the M.S. and Ph.D. program is March 1st for admission in the following fall semester.

Degree Program in Pharmacology

Doctor of Philosophy (Ph.D.) Program

The objectives of this program are to prepare highly qualified students for careers in research and teaching in the field of pharmacology. Ph.D. candidates will be required to demonstrate a broad knowledge of the field of pharmacology and detailed expertise in their research area. Graduate studies in pharmacology will provide graduate students with a comprehensive educational program in pharmacology. During the program of studies, the pharmacology graduate student will work closely with his or her mentor and department faculty to master the program goals. These goals include student demonstration of an advanced mastery of pharmacology as evidenced by the ability to critically judge research in the field of pharmacology, initiate scholarly activity based on current literature, and maintain the highest ethical and professional standards.

- Doctor of Philosophy (Ph.D.), Pharmacology (http://catalog.creighton.edu/graduate/graduate-programs-courses/pharmacology/pharmacology-phd)

Master of Science (M.S.) Program

The objectives of the program include preparation of the student for the following career paths:

1. Teaching of Pharmacology at the undergraduate level
2. Participation in team research in universities, industry or government.

In addition, the M.S. program is an excellent method for students to receive additional preparation for pursuit of a M.D. or Ph.D. degree. The Master's program emphasizes a combination of course work, laboratory experience and training in the scientific method.

- Master of Science (M.S.), Pharmacology
Courses

PHR 531. Chemical Basis Of Drug Action I. 3 credits. FA
The chemical basis for drug action in vivo and in vitro. General chemical principles, physicochemical properties and drug-receptor interactions are used to derive structure-activity relationships for important drug classes permitting the understanding of the pharmacological and biopharmaceutical profiles of currently available drug products. Provides a basis for predicting biological properties and activities of future products. P. DC.

PHR 532. Chemical Basis Of Drug Action II. 3 credits. SP
Continuation of PHR 531. P. DC.

PHR 537. Rational Drug Design And Discovery. 2 credits. FA, OD
Scientific basis for the rational design and development of new drug molecules. Discussion of drug-receptor theory, structure-activity relationships, and specific examples of the design of new drugs. P. DC.

PHR 595. Directed Independent Study. 0-5 credits. FA, OD, SP, SU
Supervised independent projects that may include laboratory work, assigned readings, research papers, etc. Available in autonomic pharmacology, cardiovascular pharmacology, exocrine pharmacology, and neuropharmacology. P. Undergraduate or Gr. stdg. and DC.

PHR 597. Directed Independent Research. 1-4 credits. FA, OD, SP, SU
Supervised independent research for motivated students to become involved in ongoing original research projects of the pharmacology faculty. P. Undergraduate or Gr. stdg. and DC.

PHR 631. Medical Pharmacology I. 5 credits. FA
Human pharmacology and therapeutics. Lectures, conferences, and demonstrations.

PHR 632. Medical Pharmacology II. 5 credits. SP
A continuation of Medical Pharmacology I.

PHR 650. Introduction to Neuropharmacology. 3 credits. SP
This course is designed for graduate students with a background in biology, chemistry, biochemistry, psychology, pre-pharmacy and/or pre-medicine. Pharmacology is more than the study of the mode of action of drugs. It is a science which uses the basic concepts of biology and chemistry to determine how drugs affect the organism; it gives a unique perspective in understanding how cells, organ systems, and organisms function. Unlike other basic science fields, pharmacology is a special field in which one can systematically investigate the mechanism for a biological event—from the molecular level to the whole animal. Pharmacology also allows us to study how biological systems fail to function, providing information on the etiology of disease. Pharmacologic research is essential for the development, testing and clinical use of drugs to treat disease.

PHR 711. Receptor and Molecular Pharmacology. 3 credits. AY, SP
Exhaustive treatment of receptor and molecular pharmacology that considers historical development of concepts, radioligand receptor binding, drug-receptor interactions, receptor characterization and isolation, and signal transduction. P. PHS 601; BCH 600 or DC.

PHR 715. Advanced Pharmacology. 3 credits. OD
Discussion of recent advances in the pharmacology of cardiovascular, autonomic and central nervous systems. Comprehensive review of drug classes including discussions on possible mechanisms by which drugs produce functional effects in these systems. P. Gr. stdg.; PHR 631; or DC.

PHR 717. Molecular Biology in Pharmacology. 2 credits. FA, OD
A survey course in molecular biology and relevant techniques. The course is geared to pharmacologists and others in medical and scientific fields seeking fundamental knowledge of this area. The goal is to provide an understanding of the theoretical and practical aspects of molecular biology for use in research. P. DC.

PHR 750. Research Discussions in Pharmacology. 1 credit. FA, SP, SU
Students will meet with their course director once weekly to discuss laboratory research topics as assigned by the course director. Topics will usually be pertinent to the research activity of the course director. Instruction will be given through a combination of didactics, small group sessions, student presentations and independent study. P. DC.

PHR 760. Research Rounds in Pharmacology. 1-3 credits. FA, SP
This course will teach students how to formally present their research progress and results, and will provide students with frequent feedback by faculty members and fellow students. P. DC.

PHR 790. Research Methods in Pharmacology. 1-5 credits. FA, OD, SP, SU
Laboratory rotations in which graduate students perform or observe methods used in pharmacological research. The value of the method and its application to the research efforts of the pharmacology faculty are described in detail. P. DC.

PHR 791. Pharmacology Seminar. 1 credit. FA, SP
Seminar in selected subjects for pharmacology graduate students. P. DC.

PHR 794. Special Topics in Pharmacology. 1-4 credits. FA, OD, SP, SU

PHR 795. Directed Independent Study. 1-6 credits. FA, SP, SU

PHR 797. Master's Directed Independent Research. 1-6 credits. FA, SP, SU
Supervised original research. P. DC.

PHR 799. Master's Thesis. 1-6 credits. FA, SP, SU
Review of the literature and research data; writing of the thesis. Student must register for this course in any term when engaged in formal preparation of the Master's thesis; however, six credit hours are the maximum applicable toward the degree. P. DC.

PHR 897. Doctoral Directed Independent Research. 1-6 credits. FA, SP, SU
Supervised original research. P. DC.

PHR 899. Doctoral Dissertation. 1-6 credits. FA, SP, SU
This investigative work is the principal area of research carried out by the candidate during doctoral studies. It is conducted under the direct supervision of the candidate's major adviser and dissertation committee in preparation for the doctoral dissertation. Twenty credit hours are the maximum applicable toward the degree. Students will register for this course during formal preparation of the doctoral dissertation. P. PHR 897.