

Pharmaceutical Sciences/ Pharmacodynamics (M.S.)

About The Program:

The School of Pharmacy offers a graduate program leading to the M.S. and to the Ph.D. in Pharmaceutical Sciences with a concentration in Pharmacodynamics. The program is designed to prepare students for positions in the pharmaceutical industry, government agencies, and faculty positions in departments engaged in biomedical research.

Career Options: Graduates generally accept employment offers shortly before or after defending their thesis. Job opportunities for graduates include positions as postdoctoral researchers, scientists in the pharmaceutical industry, and faculty members in a variety of departments involved in biomedical research.

Prerequisites for Admission: A baccalaureate degree in Biochemistry, Biology, Molecular Biology, Pharmacology, Pharmacy, or Psychology is required.

Areas of Specialization: The Pharmacodynamics concentration involves the study of integrated drug transport and mechanism of drug action research.

Requirements of Programs:

- **Total Credit Hours:** 30

Core Courses

Pharmaceutical Analysis - Application of chemical analysis as it relates to pharmaceuticals and pharmaceutical manufacturing. Classical separation methods including GC, HPLC, and NMR as well as hyphenated techniques (GC-MS & HPLC-MC) will be explored. The student will also be introduced to immunologic antibody based procedures and emerging technologies.

Seminar in Pharm Science

Department of Pharmaceutical Sciences Seminar Series - The goal of the course is to expose graduate students in the Department of Pharmaceutical Sciences to the faculty research in our department. Students will be presented with a number of research topics, including pharmaceuticals, pharmacokinetics, medicinal chemistry, biotransformation, pharmacology, and physiology. In addition to the presentations by faculty members, several guest speakers will present their research topics and discuss their opinions on science careers outside of academia (i.e., industry, medical writing, medical science liaison, etc.). Through exposure to these diverse research topics, students will become more well-rounded scientists and become more aware of career opportunities that are available to them.

Pharmacokinetics - The objective of this course is to present the fundamental principles of pharmacokinetics (PK). The topics will include PK data analysis, dosage regimen design, and the determinants of drug absorption, distribution, metabolism, and excretion. Pharmacodynamics, the study of drug concentration - response relationships, will also be presented.

Principles in Drug Discovery - In this course, students will receive an introduction to the fundamental principles of drug discovery and development, beginning with an historical overview of drug discovery.

Bioethics in Research

Pharmacodynamics - This course covers the theoretical underpinnings and practical aspects of quantitative pharmacology. A key feature of the course is its concentration on the integrated study of a drug's pharmacokinetics (transport to its site of action: including absorption, distribution, biotransformation, and excretion) and its mechanism of action at the site of action. Emphasis is placed on the mathematical foundations of such topics as drug-receptor theory, Schild analysis, Furchgott's method, radioligand binding studies, PK/PD modeling, and isobolographic analysis of drug combinations.

Advanced Pharmacogenomics - The course is a one semester course focused on inherited factors that modulate drug response. Special problems of genetic variability in humans, detection and prediction of pharmacologically relevant genetic polymorphisms will be discussed. The course will integrate current mechanistic knowledge of drugs, human genetics, data mining, and analytical tools to tailor drug administration for a specific genetic background.

Statistical Quality Control - An introduction to statistical concepts, this course reviews control charts for variables, probability theory, control charts for attributes, and acceptance sampling systems. Class discussions include application to quality control of pharmaceutical manufacturing.

Concentration-Specific Courses (6 credits)

Electives (3 credits)

Non-Didactic Course

Master's Research - Master's Research course appropriate for students finished with coursework and working with a faculty member on the thesis.

Courses:

Click [HERE](#) for more information on the courses below.

- Statistical Quality Control
- Biotechnology: Bioprocess Basic
- Good Manufacturing Practices
- High Purity Water System
- Production of Sterile Products
- Sterilization Processes
- Pharmaceutical Drug Dosage Forms
- Development of Sterile Products
- Regulatory Sciences
- Topics in Pharmaceutical Sciences
- Principles of Drug Action/
Pharmacokinetics
- Pharmaceutical Analysis
- Pharmaceutical Manufacturing I:
Preformulation/ Formulation
- Pharmaceutical Manufacturing II
- Pharmaceutical Biotechnology
- Physical Pharmacy I
- Applied Biopharmaceutics
- Advanced Principles of Pharmacokinetics
- Advanced Medicinal Chemistry I
- Advanced Medicinal Chemistry II
- Radioisotope Methodology
- Seminar in Pharm Science

- Introduction to Toxicology
- Department of Pharmaceutical Sciences Seminar Series
- Writing and Publishing a Review Article
- Bioinformatic Genes Drug
- Journ Club/ Pharmacodynam
- Laboratory Experience in Pharmaceutical Sciences
- Pharmacokinetics
- Principles in Drug Discovery
- Bioethics in Research
- Principles of Biochemistry
- Topics in Pharmaceutical Biotechnology
- Introduction to Translational Molecular Technology
- Neuroscience of Pain
- Pharmacodynamics
- Advanced Pharmacogenomics
- Pharmaceutical Sciences Literature Review
- Abuses of Drugs and Chemicals
- Modified Release Dosage Forms
- Advanced Pharmacokinetic Modeling I
- Physical Pharmacy II
- Chemical Surfaces & Interfaces
- Advanced Drug and Gene Delivery Systems
- Food and Drug Law
- Dermatopharmaceutics
- Teaching in Higher Educ
- Preliminary Examination Preparation
- Master's Research