Pharmacy, PhD

The College of Pharmacy offers a Doctor of Philosophy (PhD) in pharmacy with subprograms in three areas: drug discovery and experimental therapeutics, health services research, and pharmaceutics.

The drug discovery and experimental therapeutics subprogram offers a unique educational opportunity for students interested in drug discovery and the development of novel therapeutics. The changing landscape of drug discovery has created a need for scientists with interdisciplinary training to navigate the complex landscape of medicinal chemistry, biotherapeutics, pharmacogenetics/genomics, and basic pharmacology/toxicology.

The health services research subprogram provides an innovative approach to studying the challenges facing the health care system and provides evidence to support policy-based solutions. It combines ideas across several distinct scientific paradigms (sociology, economics, psychology, business, and anthropology) to better understand the factors leading to decisions in health care and the consequences of these decisions. Students gain a broad knowledge of health and pharmaceutical care, informed by theories from economics and social psychology. The subprogram teaches intellectual and practical skills to investigate research questions dealing with current issues.

The pharmaceutics subprogram provides a multidisciplinary science focus that examines the development, production, and characterization of dosage forms, as well as the disposition and action of drugs in the body. As pharmaceutical scientists have been engaged in the development of novel biomaterials for sophisticated drug delivery systems, they also have expanded into research with applications in the development of medical devices and tissue engineering.

For more information about graduate study, visit the College of Pharmacy website.

Learning Outcomes

Graduates will demonstrate the ability to:

- identify important research problems through the development of subject matter expertise and critical evaluation of the current state of knowledge in that area of expertise;
- develop testable hypotheses and/or research questions and then utilize sound methodology to design research approaches to address them;
- conduct, analyze, and interpret independent original research that contributes new knowledge to the field of study;
- effectively communicate research results to a range of audiences in various multimedia formats;
- conduct all aspects of research and communication of results with the highest ethical standards; and
- be prepared for a diversity of career options in academia, industry, government, or other relevant fields.

Graduate Education

Graduate education prepares students with advanced knowledge and skills in specialized fields. At the University of Iowa, the Graduate College advocates for student-centered graduate education and supports equitable application of rules and policies across graduate programs.

Academics

University of Iowa graduate credentials are regulated by policies and requirements found in the Graduate College Manual of Rules and Regulations. This includes minimum grade-point average (GPA) requirements for academic standing and degree conferral. The Graduate College sets the minimum requirement. Individual graduate programs may establish higher GPA requirements.

Admissions

Graduate student applicants must meet admission requirements for both the Graduate College and the program to which they have applied. University of Iowa graduate admission requirements are published by the Graduate College and on the Graduate Admissions website.

Financial Support

Graduate students might be eligible for financial support. Several contingencies apply, including degree program and award type, satisfactory progress toward degree, satisfactory completion of all duties related to an appointment, and availability of funding. Graduate students should inquire directly with their program for more information about funding availability. The Graduate Student Employment Standards govern the employment relationship between the University of Iowa and all graduate teaching and research assistants in all matters except wages, which are covered by an existing collective bargaining agreement or the conditions of an applicable federal grant.

Drug Discovery and Experimental Therapeutics

The Doctor of Philosophy in pharmacy with a subprogram in drug discovery and experimental therapeutics requires 72 s.h. of credit. The degree requires 25 s.h. of didactic coursework, including 15 s.h. of required courses and a minimum of 10 s.h. of interdisciplinary electives. The remaining hours may be fulfilled by research, seminars, additional electives, and the doctoral dissertation. The typical time to complete the degree is five years. Students must maintain a UI cumulative grade-point average of at least 3.00.

The curriculum provides a strong foundational base of knowledge along with options for a tailored experience for students. The program prepares scientists capable of bridging the complex landscape of medicinal chemistry, biotherapeutics, pharmacogenetics/genomics, and basic pharmacology/toxicology.

The Doctor of Philosophy in pharmacy with a subprogram in drug discovery and experimental therapeutics requires the following work.

Required Courses

Students complete all of the following courses. In some instances a course may be waived by the program director due to a student's academic background, but all students must complete at least 15 s.h. in required courses.

Course #	Title	Hours
At least 15 s.h. from these:		
PHAR:5510	Pharmaceutical Sciences and Experimental Therapeutics Seminar	1-2
PHAR:6504	Mastering Reproducible Science	1
PHAR:6515	Perspectives in Drug Discovery	2
PHAR:6820	Drug Discovery and Experimental Therapeutics Research	arr.
BIOS:4120	Introduction to Biostatistics (Fall semester of 1st year)	3
BMED:7270	Scholarly Integrity/ Responsible Conduct of Research I (taken in second year)	0
BMED:7271	Scholarly Integrity/ Responsible Conduct of Research II (taken in second year)	0
Including at least four courses from these:		
PHAR:5400	Principles of Pharmacogenomics	3
PHAR:5512	Drug Discovery and Mechanisms	3
PHAR:5541	Total Synthesis of Biologically Active Natural Products	3
PHAR:5545	Current Medicinal Chemistry	3
PHAR:5549	Analytical Biochemistry	3
PHAR:6501	Principles and Mechanisms of Chemical Toxicology	3
PHAR:7101	Principles of Experimental Therapeutics	3
PHAR:7102	Applied Clinical and Translational Science	3
PHAR:8148	Pharmacokinetics and Dose Optimization	2
or PHAR:4146	Drug Disposition and Pharmacokinetics	

Interdisciplinary Electives

In consultation with their advisor, students select a minimum of 10 s.h. of elective courses that are tailored to the student's specific research area. Students are encouraged to select from the following courses. Additional electives can be selected at the discretion of the advisor.

Biomedical Sciences and Experimental Therapeutics

Course #	Title	Hours
BME:4310/ BMB:4310	Computational Biochemistry	3
BME:5101	Biomaterials and Implant Design	3
BME:5200/ IGPI:5212	Biomedical Signal Processing	3
BME:5335	Computational Bioinformatics	3
GENE:4213/ BIOL:4213/ IGPI:4213	Bioinformatics	2,4
GENE:7191	Human Molecular Genetics	3
HHP:4510	Energetics in Health and Disease	3
MICR:3147	Immunology and Human Disease	3
MICR:3170	Bacterial Genetics	3
MMED:5270/ IGPI:5270/ PATH:5270	Pathogenesis of Major Human Diseases	3
MMED:6220/ ACB:6220/ MPB:6220	Mechanisms of Cellular Organization	3
MMED:6226/ ACB:6226/ MPB:6226	Cell Cycle Control	1
MMED:6227/ ACB:6227/ MPB:6227	Cell Fate Decisions	1
MMED:6230	Pathogenesis of Metabolic and Cardiovascular Disorders	3
MMED:6260	Methods for Molecular and Translational Medicine	1
NSCI:5212/ PSY:5212	Foundations in Behavioral and Cognitive Neuroscience	4
NSCI:5653/ BIOL:5653/ PSY:5203	Fundamental Neurobiology I	3
NSCI:5654/ BIOL:5654/ PSY:5205	Fundamental Neurobiology II	3
PCOL:3101	Pharmacology I: A Drug's Fantastic Journey	3
PCOL:3102	Pharmacology II: Mechanisms of Drug Action	3

Clinical Pharmaceutical Sciences

Course #	Title	Hours
ACB:6200/ GENE:6200	Current Topics in Genetics	1
BIOS:4510	Data Science Foundations in R	2
BIOS:5120/ IGPI:5120/ STAT:5610	Regression Modeling and ANOVA in the Health Sciences	3
BIOS:6610/ IGPI:6610	Statistical Methods in Clinical Trials	3
GENE:4213/ BIOL:4213/ IGPI:4213	Bioinformatics	2,4
IGPI:5110/CS:5110	Introduction to Informatics	3
IGPI:5130/ BIOS:5130	Applied Categorical Data Analysis	3
MMED:5270/ IGPI:5270/ PATH:5270	Pathogenesis of Major Human Diseases	3
PCOL:5136	Pharmacogenetics and Pharmacogenomics	1

Medicinal Chemistry

Course #	Title	Hours
CHEM:4372	Advanced Organic Chemistry	3
CHEM:5321	Spectroscopic Methods in Organic Chemistry	3-4
CHEM:5326	Organic Reactions	3
CHEM:5329	Advanced Organic Synthesis	1-3

Comprehensive Examination

Students take the comprehensive examination between the beginning and end of their third year of graduate study.

Dissertation

The dissertation is defended in a final oral examination.

Health Services Research

The Doctor of Philosophy in pharmacy with a subprogram in health services research requires 72 s.h. of credit. Students must maintain a UI cumulative grade-point average of at least 3.00.

In the first two years in the program, students participate in ongoing research and complete coursework. In the third year, emphasis is placed on developing a dissertation topic. The following two years are spent on research and writing the dissertation.

The Doctor of Philosophy in pharmacy with a subprogram in health services research requires the following work.

Core Competencies

Students complete the following coursework before they take the core competency qualifying exam.

Health Services Research

Course #	Title	Hours
All of these:		
PHAR:6320	Health Services Research	arr.
PHAR:6330	Models of Patient Behavior and Choice	3
PHAR:6331	Models of Provider Behavior and Choice	3
HMP:4000	Introduction to the U.S. Health Care System (or equivalent as approved by advisor)	3

Research Methods and Statistics

Course #	Title	Hours
All of these:		
PHAR:5350	Introduction to Research Methods	3
PHAR:5360	Applied Research Methods: Primary Data	2
PHAR:5365	Applied Research Methods: Secondary Data	2
BIOS:4120	Introduction to Biostatistics	3
BIOS:5120/ IGPI:5120/ STAT:5610	Regression Modeling and ANOVA in the Health Sciences	3
Additional statistics coursework (biostatistics, economics, education, psychology, mathematics, or sociobiology)		6

Specialty

The specialty area requires at least 24 s.h. of coursework. With the guidance of their faculty advisor, students develop a plan of study including coursework in specialized research methods, theory, content expertise, and other relevant areas.

Additional Requirements

Students are expected to participate in specific aspects of ongoing research. These research activities are often paid graduate research assistantships; course credit is not available for paid assistantships. By the end of their third year, students are expected to present the results from one completed research project at a regional or national meeting.

Course #	Title	Hours
PHAR:5310	Health Services Research Seminar (students enroll in the seminar for 1 s.h. each semester they are on campus, excluding summer session)	1
BMED:7270	Scholarly Integrity/ Responsible Conduct of Research I (taken in second year)	0
BMED:7271	Scholarly Integrity/ Responsible Conduct of Research II (taken in second year)	0

Pharmaceutics

The Doctor of Philosophy in pharmacy with a subprogram in pharmaceutics requires 72 s.h. of credit. The degree requires 30 s.h. in didactic coursework, including a minimum of 15 s.h. in divisional courses and 15 s.h. of elective coursework. The remaining 42 s.h. can be fulfilled with research (PHAR:6720 Pharmaceutics Research) or electives. Students must maintain a UI cumulative grade-point average of at least 3.00.

Entering students who do not have basic knowledge in all subjects follow a plan of study in order to complete divisional requirements during their first and second years.

The Doctor of Philosophy in pharmacy with a subprogram in pharmaceutics requires the following work.

Divisional Courses

Course #	Title	Hours
15 s.h. from these:		
PHAR:4146	Drug Disposition and Pharmacokinetics	2
PHAR:4800	Chemical and Biophysical Properties of Drugs	2
PHAR:5510	Pharmaceutical Sciences and Experimental Therapeutics Seminar (does not count towards didactic requirements)	1-2
PHAR:5745	Advanced Biopharmaceutics and Drug Delivery	arr.

PHAR:5880	Protein Pharmaceuticals	4
PHAR:6710	Pharmaceutics Graduate Seminar (enrollment required each semester until completion of comprehensive exam)	1
BMED:7270	Scholarly Integrity/ Responsible Conduct of Research I (taken in second year)	0
BMED:7271	Scholarly Integrity/ Responsible Conduct of Research II (taken in second year)	0

Elective Courses

Students choose appropriate electives for individual research objectives.

Comprehensive Examination

Students take the comprehensive examination between the beginning and end of their third year of graduate study.

Dissertation

The dissertation is defended in a final oral examination.

Admission

Applicants must meet the admission requirements of the Graduate College. They must:

- hold a bachelor's degree from a U.S. institution or an equivalent degree from another country as determined by University of Iowa Admissions; and
- have a minimum grade-point average of at least 3.00.

Students may submit a Graduate Record Examination (GRE) General Test score, but that is optional.

Visit Graduate Degree: How to Apply on the College of Pharmacy website for a list of program requirements and application deadlines. Academic requirements for maintaining graduate registration are determined by the Graduate College and by the individual divisions in the College of Pharmacy.

Career Advancement

Advanced study in the pharmaceutical sciences prepares students for research, teaching, and administrative positions in the pharmaceutical industry, in colleges and universities, in government agencies, and in health-related institutions and organizations.

Academic Plans

Sample Plans of Study

Sample plans represent one way to complete a program of study. Actual course selection and sequence will vary and should be discussed with an academic advisor. For additional sample plans, see MyUI.

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- Drug Discovery and Experimental Therapeutics Subprogram
- Health Services Research Subprogram
- Pharmaceutics Subprogram