

PHARMACEUTICAL SCIENCES, PH.D.

Learning Outcomes

- Students will demonstrate proficiency in understanding principles of medicinal chemistry, pharmacology, and pharmaceuticals. Students will also demonstrate knowledge in techniques of biochemistry, molecular biology, and physiology as applied to pharmaceutical research.
- Students will be able to identify pertinent research problems, and formulate a research plan.
- Students will be able to critically analyze relevant literature, and to communicate scientific findings with oral presentations.
- Students will be able to generate and analyze original research results, and to communicate these results to the scientific community.
- Within five years of graduation with their PhD degree, students will be engaged in professional careers and/or postdoctoral fellowship.
- Over time, graduates of our program will be successful in professional careers.

Degree Requirements (60-61 Hours Post-baccalaureate)

Drug Discovery and Biomedical Sciences

The Ph.D. track in Drug Discovery and Biomedical Sciences requires a minimum of 60 hours beyond the baccalaureate degree, or a minimum of 30 hours beyond the master's degree as approved by advisement, including at least 12 credit hours of dissertation preparation. The Ph.D. degree requirements include an admission-to-candidacy examination, a comprehensive examination, and a dissertation.

Pharmacy Administration

Students who enter the Ph.D. program in Pharmacy Administration with a post-baccalaureate degree (BS or PharmD) must successfully complete at least 61 hours of graduate course work. Students who enter the Ph.D. program in Pharmacy Administration with a Masters of Science (MS) degree in a health-related field must successfully complete at least 37 hours of graduate course work beyond the MS as approved by the advisor, including at least 12 credit hours of dissertation preparation.

The Ph.D. degree requirements include an admission-to-candidacy examination, a comprehensive examination, and a dissertation.

In the Department of Drug Discovery and Biomedical Sciences

1. A research advisor must be chosen by the end of the first year.
2. Admission to candidacy must occur by the end of the second year, and includes the following:
 - a. Submission of a doctoral program of study form. Satisfactory completion of all coursework taken in the first two years will be evaluated by the committee.
 - b. Submission of a written initial research proposal, followed by an oral presentation and defense of the proposal to the thesis committee.
3. The comprehensive written and oral examination must be completed by the end of the third year.

4. A written dissertation, along with an oral presentation and defense, is required for the completion of the Ph.D. degree

In addition to the general requirements listed above, candidates for the Ph.D. degree are required to complete four departmental seminar courses:

Ph.D., Pharmaceutical Sciences (60 Hours)

Required Courses

Course	Title	Credits
PHAR 700	Principles of Pharmacology, Medicinal Chemistry, and Pharmaceuticals	4
PHAR 701	Current Topics in Pharmaceutical Sciences	4
PHAR 712A	Seminar in Pharmaceutical Sciences ¹	1
PHAR 712B	Seminar in Pharmaceutical Sciences ¹	1
PHAR 712C	Seminar in Pharmaceutical Sciences ¹	1
PHAR 712D	Seminar in Pharmaceutical Sciences ¹	1
Select 12 hours of electives ²		12
Total Credit Hours		24

¹ A maximum of 4 hours credit can be earned for PHAR 712.

² Electives will be chosen based on the needs of the graduate student. Areas of emphasis include Biomedical Chemistry, Synthetic Medicinal Chemistry, Pharmaceuticals, and Pharmacology. Electives will be chosen based on the area of emphasis and must be approved by the Ph.D. advisory committee and the Graduate Program Director. Electives must be 700 level and above, or any course approved by the Graduate School for Graduate Credit

Doctoral Directed Research (24 Hours)

Course	Title	Credits
PHAR 896	Doctoral Directed Research ¹	1-6
Total Credit Hours		1-6

¹ Other didactic electives may be applied toward the total hours of credit required if approved by the Ph.D. advisory committee.

Dissertation Preparation (12 Hours)

Course	Title	Credits
PHAR 899	Dissertation Preparation	12
Total Credit Hours		12

Concurrent Pharm.D. and Ph.D. (60 Hours minimum)

In addition to the general requirements listed above, students pursuing the Pharm.D. and Ph.D. concurrently will take elective courses that are approved for graduate credit and fulfill requirements for the Ph.D. program. Electives in the Pharm.D. curriculum: up to nine credit hours can count toward both degrees, with the following stipulations. The student must have completed at least 90 hours of undergraduate course work, have a minimum GPA of 3.40, and have form GS-59 on file in The Graduate School. A grade of **B** or higher must be earned for the course to count for graduate credit. At least half of the electives must be numbered 700 or above. Courses numbered 500-699 are acceptable only if they have been approved for graduate credit. Graduate courses taught in units other than pharmacy must be approved by the graduate faculty of pharmacy as appropriate for a Ph.D. degree in pharmaceutical sciences. Registration for each course requires approval of the student's advisor, the chair of the student's department, the graduate director of the Ph.D. program, and the dean of The Graduate School. Form GS-59A must be processed for each

graduate credit course at the time of registration to permit the registrar's office to properly enroll the student for graduate credit.

Required Courses

Course	Title	Credits
PHAR 712A	Seminar in Pharmaceutical Sciences	1
PHAR 712B	Seminar in Pharmaceutical Sciences	1
PHAR 712C	Seminar in Pharmaceutical Sciences	1
PHAR 712D	Seminar in Pharmaceutical Sciences	1
Total Credit Hours		4

Electives

Course	Title	Credits
Select up to three graduate-level courses taken as electives for the Pharm.D. ¹		0-9
Select two to five graduate-level courses not taken for the Pharm.D. degree		7-15
Total Credit Hours		7-24

¹ Electives must be approved by the Ph.D. advisory committee as appropriate for one of the following specialty areas.

Doctoral Directed Research (up to 29 Hours)

Course	Title	Credits
PHAR 896	Doctoral Directed Research ¹	1-6
Total Credit Hours		1-6

¹ Other didactic electives may be applied toward the total hours of credit if approved by the Ph.D. advisory committee.

Dissertation Preparation (12 Hours)

Course	Title	Credits
PHAR 899	Dissertation Preparation	12
Total Credit Hours		12

In the Department of Clinical Pharmacy and Outcomes Sciences

The Ph.D. in Pharmaceutical Sciences with an emphasis in Pharmacy Administration prepares the graduate for many careers in academia and the pharmaceutical industry. The program is designed to meet the specific needs and objectives of the student and provide a strong foundation of course work and experiences in the areas of pharmaceutical outcomes research. In addition to the core coursework, students select a minor field to develop additional expertise in economics, pharmacoepidemiology, biostatistics, marketing or health policy. The program has a strong emphasis on developing quantitative, analytical and data management skills and uses a multidisciplinary approach in teaching and research activities.

Students who enter the Ph.D. program in Pharmacy Administration with a post-baccalaureate degree (BS or PharmD) must successfully complete at least 61 hours of graduate course work. Students who enter the Ph.D. program in Pharmacy Administration with a Masters degree in a related field must successfully complete at least 37 hours of graduate course work.

After enrolling in the program, the student must choose a research advisor by the end of the first year of enrollment. Admission to candidacy must occur by the end of the second year after passing a qualifying examination based on all courses completed in the business and

analytical core. The comprehensive written and oral examination must be completed by the end of the third year of the program. A written dissertation, along with an oral presentation and defense, is required for the completion of the Ph.D. degree.

Ph.D. Pharmacy Administration Option (61 Hours Minimum Post-Baccalaureate)

Pharmacy Core (28 hours)

Course	Title	Credits
PHAR 711A	Seminar in Pharmacy Administration	1
PHAR 711B	Seminar in Pharmacy Administration	1
PHAR 711C	Seminar in Pharmacy Administration	1
PHAR 711D	Seminar in Pharmacy Administration	1
PHAR 740	Socio-Economics of Pharmacy Practice	3
PHAR 741	Pharmaceutical Outcomes Database Development	3
PHAR 742	Research Methods in Pharmaceutical and Health Outcomes Sciences	3
PHAR 748	Principles of Pharmacoeconomics	3
PHAR 899	Dissertation Preparation	12
Total Credit Hours		28

Business Core (12 hours)

Course	Title	Credits
ECON 720	Managerial Economics	3
MKTG 701	Marketing Management	3
ACCT 728	Financial Accounting	3
ACCT 729	Managerial Accounting	3
Total Credit Hours		12

Analytic Core (12 hours)

Course	Title	Credits
BIOS 700	Introduction to Biostatistics	3
or STAT 515	Statistical Methods I	
BIOS 757	Intermediate Biostatistics	3
or STAT 516	Statistical Methods II	
BIOS 754	Discrete Data Analysis	3
or STAT 518	Nonparametric Statistical Methods	
EPID 701	Concepts and Methods of Epidemiology	3
Total Credit Hours		12

Minor/Cognate (9 Hours Minimum)

Students in the Ph.D. in Pharmacy Administration must also take at least 9 hours of minor/cognate graduate level courses in one of the following areas: biostatistics, marketing, health policy, economics, or epidemiology. Minor/cognate courses will be identified and approved by the major advisor and graduate director in consultation with the student.

Ph.D. Pharmacy Administration Option (37 Hours Minimum Post-Masters)

Students who enter the Ph.D. program in Pharmacy Administration with a Masters degree in a related field must successfully complete at least 37 hours of graduate course work. As part of the core pharmacy requirements, candidates for the Ph.D. degree in Pharmacy Administration are required to complete four departmental seminar courses (PHAR 711A-D). A maximum of 4 hours credit can be earned for PHAR 711. Students must also take at least 9 hours of minor/cognate courses in one of the following areas: biostatistics, marketing, health policy, economics,

or epidemiology. Minor/cognate coursework will be determined by the advisor and graduate director in consultation with the student.

All students are required to submit a dissertation based upon original research, meeting all requirements of The Graduate School prior to award of the degree.

Required Courses (28 hours)

Course	Title	Credits
PHAR 711A	Seminar in Pharmacy Administration	1
PHAR 711B	Seminar in Pharmacy Administration	1
PHAR 711C	Seminar in Pharmacy Administration	1
PHAR 711D	Seminar in Pharmacy Administration	1
PHAR 740	Socio-Economics of Pharmacy Practice	3
PHAR 741	Pharmaceutical Outcomes Database Development	3
PHAR 742	Research Methods in Pharmaceutical and Health Outcomes Sciences	3
PHAR 748	Principles of Pharmacoeconomics	3
PHAR 899	Dissertation Preparation	12
Total Credit Hours		28

Additional coursework may be required as part of the program of study for post-MS entrants. Additional coursework will be determined by the advisor and graduate director after considering the skills, competencies and experiences of the post-MS student.

Minor/Cognate (9 Hours Minimum)

Students in the Ph.D. in Pharmacy Administration must also take at least 9 hours of minor/cognate graduate level courses in one of the following areas: biostatistics, marketing, health policy, economics, or epidemiology. Minor/cognate courses will be identified and approved by the major advisor and graduate director in consultation with the student.