

## Emphasis - Pharmaceutics

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### Ph.D. in Pharmaceutical Sciences Description

The Ph.D. in pharmaceutical sciences can be completed with an emphasis in environmental toxicology, medicinal chemistry, pharmaceuticals, pharmacology, pharmacognosy, or pharmacy administration.

**Minimum Total Credit Hours: 54**

#### Course Requirements

Requirements for each emphasis area are given in the respective program description sections. Each emphasis area requires students to complete a minimum of 36 semester hours of course work and 18 hours of dissertation

### Emphasis - Pharmaceutics Description

The Ph.D. in pharmaceutical sciences with an emphasis in pharmaceuticals deals with the science of dosage form design and embraces all facets of the process of turning a new chemical entity into a medication that can be safely and effectively used by patients. Pharmaceuticals deals with the formulation of drugs into dosage forms such as tablets, capsules, creams, gels, ointments, transdermal and transmucosal patches, solutions, sprays, drops, injectables, and many others.

#### Goals/Mission Statement

The primary mission of the Department of Pharmaceutics and Drug Delivery includes providing curricular content in the areas of physical pharmacy, basic pharmacokinetics, dosage forms, and drug delivery systems, and biopharmaceutics in both the Bachelor of Science in Pharmaceutical Sciences (B.S.P.S.) and the Doctor of Pharmacy (Pharm.D.) professional degree programs. In addition, the department's educational mission is to educate M.S. and Ph.D. graduates with scientific competence in these related areas of expertise, including preformulation, formulation, pharmaceutical processing, and novel drug delivery systems. The departmental faculty also provides this same expertise as members of multidisciplinary teams, to scientific projects conducted in the National Center for Natural Products Research (NCNPR) and the Pii Center for Pharmaceutical Technology.

#### Course Requirements

The graduate course work requirement for the Ph.D. in pharmaceutical sciences with an emphasis in pharmaceuticals requires 36 semester hours of course work. The following core courses are required:

- Statistics and Experimental Design [BISC 504 (4 hours) or HP 626 -(3 hours)];
- Graduate Student Survival Strategies (BMS 601) (2 hours) or Research Ethics (GRAD 600) (1 hour);
- Applied Pharmacokinetics (PHAR 760) (3 hours);
- Product Development (PHAR 749) (3 hours);
- Formulation Development (PHAR 650) (3 hours);
- Advanced Pharmaceutics (PHAR 741) (4 hours);
- Stability of Pharmaceutical Systems (PHAR 744) (3 hours);
- Applied Pharmaceutics (PHAR 750) (2 hours);

In addition, at least two of the following electives are required:

- Colloid and Surface Science (Ch E 545) (3 hours);
- Analytical Pharmaceutics (PHAR 735) (3 hours);
- Pharmaceutical Manufacturing (PHAR 658) (3 hours);
- Regulatory Science I (PHAR 651) (3 hours);
- Regulatory Science II (PHAR 652) (3 hours);
- Problems in Pharmaceutics (PHAR 541, PHAR 542) (1-3 hours);
- Introduction to Polymer Science (Ch E 543) (3 hours);
- Coating Materials Processing and Applications (Ch E 597) (3 hours).

Additional courses may be required by the student's research director and/or advisory committee. If a required course is unavailable, the Department of Pharmaceutics and Drug Delivery graduate faculty may approve an alternative course for a particular student.

#### Seminar Requirement

Students are required to register for Seminar in Current Pharmaceutical Topics (PHAR 543 or PHAR 544) every semester.

#### Other Academic Requirements

##### Comprehensive Examination:

After completion of all course work, including any additional course work required by the research director and/or dissertation committee, a student must successfully pass a comprehensive examination. If a student fails one of the sections of the exam, he or she will be allowed to retake a second exam from a given faculty member. If a student fails more than one section of the exam, he or she will be terminated from the Ph.D. program and allowed to enter the master's program. After passing the exam, a student enters the candidacy stage.

##### Dissertation Prospectus and Dissertation:

A minimum of 18 hours of dissertation research must be taken to meet degree requirements. Doctoral students must prepare and orally defend a



dissertation prospectus before their dissertation committee. Doctoral students must prepare and orally defend their dissertation, based on original and independent research, before the same committee. The general procedures and composition of the committee are governed by Graduate School policy. Prior to the student's dissertation defense, the student must have a minimum of two completed manuscript ready for submission to a referred journal for publication.

Note: An applicant may enter the Ph.D. program directly, without having to enroll in the master's program.

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