

# PHARMACEUTICAL SCIENCES (PHD AND MD/PHD)

## Curriculum

### Graduate Committee

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Pharmaceutical Science is an interdisciplinary field that utilizes a diverse group of scientific disciplines (e.g., biology, chemistry, engineering, and physics). The Pharmaceutical Sciences PhD program provides instruction and training in drug discovery, drug delivery and targeting, biophysical chemistry, bio-materials nanotechnology, nanomedicine, biopharmaceutics, pharmacokinetics, and pharmacodynamics. Students are mentored by members of the faculty whose research interests reside in developing new drugs to treat malaria, cancer, neurodegenerative diseases and infectious diseases as well as delivering and/or targeting small and large molecular weight drugs or genes to treat cancer, ophthalmic, lung, bone, cardiovascular and other diseases.

### PhD Curriculum

#### Degree Tracks

PhD students in Pharmaceutical Sciences must choose one of the following tracks:

- Drug Delivery & Biopharmaceutics;
- Biophysics;
- Medicinal Chemistry; or
- Clinical Pharmaceutical Sciences

#### General Requirements

- Completion of coursework.
- Completion of the Comprehensive Examination.
- Completion of a research project consistent with a PhD level of achievement.
- Completion and successful defense of a doctoral dissertation.
- Concurrence of the mentor and the student's Supervisory Committee.

The coursework requirements for the Pharmaceutical Sciences PhD program are detailed provided below. Students will need to complete the two core courses (IPBS 801 and PHSC 845) and all courses in track curriculum prior to taking the comprehensive examination. The need for any additional courses beyond this curriculum will be determined by the student's Supervisory Committee.

#### Coursework

| Code  | Title   | Credit Hours |
|---|---|--------------|
| <b>CORE COURSES (required courses for all tracks)</b> |   |              |
| GRAD 800  | RESPONSIBLE CONDUCT IN RESEARCH TRAINING *                                    | 0            |
| PHSC 802  | ESSENTIALS OF DRUG DISCOVERY AND DEVELOPMENT                                  | 3            |
| PHSC 845  | QUANTITATIVE PHARMACEUTICAL ANALYSIS *  | 3            |
| PHSC 960  | CURRENT TOPICS IN THE PHARMACEUTICAL SCIENCES (each fall and spring semester) | 1            |

|          |   |      |
|----------|---|------|
| PHSC 970 | SEMINAR (each fall and spring semester) | 1    |
| PHSC 999 | DOCTORAL DISSERTATION                   | 1-15 |

The student's Supervisory Committee will assist in selecting appropriate electives

\*Courses need to be completed, plus two elective courses, and track curriculum prior to taking Comprehensive Exam

| Code | Title | Credit Hours |
|------|-------|--------------|
|------|-------|--------------|

#### DRUG DELIVERY & BIOPHARMACEUTICS TRACK

**Required: Select 2 of the following 4 courses**

|          |   |   |
|----------|---|---|
| PHSC 885 | PHYSICAL PHARMACY   | 3 |
| PHSC 852 | PHARMACEUTICAL CHEMISTRY FOR DRUG DELIVERY AND NANOMEDICINE | 3 |
| PHSC 910 | PHARMACOKINETICS AND BIOPHARMACEUTICS                       | 3 |
| BIOS 806 | BIOSTATISTICS   | 3 |

**Two elective courses**

| Code | Title | Credit Hours |
|------|-------|--------------|
|------|-------|--------------|

#### BIOPHYSICS TRACK

**Required: Select 2 of the following 3 courses**

|          |                        |   |
|----------|------------------------|---|
| PHSC 885 | PHYSICAL PHARMACY      | 3 |
| PHSC 848 | NANOIMAGING/BIOIMAGING | 3 |
| PHSC 921 | BIOPHYSICAL CHEMISTRY  | 3 |

**Two elective courses**

| Code | Title | Credit Hours |
|------|-------|--------------|
|------|-------|--------------|

#### MEDICINAL CHEMISTRY TRACK

**Required courses**

|           |  |   |
|-----------|--|---|
| CHEM 8246 | (ADV. ORG. CHEMISTRY MECH - This course is offered at the University of Nebraska - Omaha)      |   |
| CHEM 8236 | (ADV. ORG. CHEMISTRY SYNTHESIS - This course is offered at the University of Nebraska - Omaha) |   |
| PHSC 830  | ADV MEDICINAL CHEM   | 3 |
| PHSC 903  | SPECTROSCOPIC METHODS AND ANALYSIS   | 3 |

**One elective course**

| Code | Title | Credit Hours |
|------|-------|--------------|
|------|-------|--------------|

#### CLINICAL PHARMACEUTICAL SCIENCES TRACK

**Required courses**

|          |   |   |
|----------|---|---|
| BIOS 806 | BIOSTATISTICS   | 3 |
| BIOS 808 | BIOSTATISTICS II  | 3 |
| PHSC 905 | APPLIED PHARMACOGENOMICS  | 3 |
| PHSC 920 | APPLIED PHARMACOKINETICS IN TRANSLATIONAL RESEARCH AND DRUG DEVELOPMENT | 3 |

**One elective course**