



### ***Twin Cities Campus***

## **Experimental and Clinical Pharmacology Ph.D.**

*Experimental and Clinical Pharmacology*

### **College of Pharmacy**

Link to a [list of faculty](#) for this program.

#### **Contact Information:**

Department of Experimental and Clinical Pharmacology, University of Minnesota College of Pharmacy, 7-115 Weaver-Densford Hall, 308 Harvard Street S.E., Minneapolis, MN 55455 (612-625-2160)

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Website: <https://z.umn.edu/ecpgrad>

- Program Type: Doctorate
- Requirements for this program are current for Spring 2019
- Length of program in credits: 48
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the [General Information](#) section of the catalog website for requirements that apply to all major fields.

The Experimental and Clinical Pharmacology (ECP) graduate program was designed specifically for students interested in clinical research. Its goal is to advance the science of human pharmacology and therapeutics to improve the safe, effective, and economical use of drugs by patients.

Students study such topics as experimental pharmacotherapy, drug metabolism, infectious disease, neuroscience/neuropharmacology, pharmacometrics, and pharmacogenomics. Graduates are prepared for distinguished careers in clinical research.

## **Program Delivery**

This program is available:

- via classroom (the majority of instruction is face-to-face)

## **Prerequisites for Admission**

The preferred undergraduate GPA for admittance to the program is 3.00.

A U.S. bachelor's degree or a comparable foreign degree from a recognized college or university is required.

Preference is given to candidates who have had a professionally-related pharmacy education, but those from other fields such as biology, chemistry, statistics, and public health will be considered.

Other requirements to be completed before admission:

All international students who are non-English speakers are required to submit TOEFL scores. TOEFL test date must be within 2 years of program start. However, applicants who have completed 24 quarter credits or 16 semester credits within the past 24 months in residence as full-time students at recognized institutions of higher learning in the United States or other English-speaking countries before entering the University of Minnesota are generally exempted from this requirement. GRE required by all students except for applicants that have completed a PharmD at a U.S.-accredited institution.

#### **Special Application Requirements:**

Students are generally admitted to the ECP program for fall semester only. All application materials should be submitted by the admissions deadline listed on the departmental website. Applications received after the application deadline will be considered on a space-available basis only.

Application to the ECP program at the University of Minnesota is done entirely online. A supplemental departmental application form is also required. Applicants should upload it directly to the online application system.

International applicants must submit score(s) from one of the following tests:

- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19



The preferred English language test is Test of English as Foreign Language

Key to [test abbreviations](#)(TOEFL).

For an online application or for more information about graduate education admissions, see the [General Information](#) section of the catalog website.

## Program Requirements

24 credits are required in the major.

24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

### Required Courses (11 credits)

Take the courses from the list below to complete the 11-credit requirement.

-Students admitted fall 2017 and fall 2018: Take ECP 5220 and 8230 (2 credits each), ECP 8100 three times (3 credits total) and ECP 8992 four times (4 credits total) to meet the 11-credit minimum.

[ECP 5220](#) - Regulatory Issues in Drug Research (2.0 cr)

[ECP 8992](#) - Directed Readings in Experimental and Clinical Pharmacology (1.0 cr)

[ECP 8100](#) - Seminar (1.0 cr)

[ECP 8230](#) - Principles of Clinical Pharmacology (2.0 cr)

### Statistical Analysis (4 credits)

Select at least one of the following courses in consultation with the advisor. Two courses are preferred and will count towards Electives or Focus Area.

[PUBH 6450](#) - Biostatistics I (4.0 cr)

or [STAT 5101](#) - Theory of Statistics I (4.0 cr)

or [PUBH 6451](#) - Biostatistics II (4.0 cr)

or [STAT 5102](#) - Theory of Statistics II (4.0 cr)

### Electives

Take additional courses, in consultation with the director of graduate studies and/or advisor to complete the 24 course credits required.

ANAT 5xxx

or ANAT 6xxx

or ANAT 7xxx

or ANSC 5xxx

or ANSC 8xxx

or BBE 5xxx

or BBE 8xxx

or BICB 5xxx

or BICB 8xxx

or BINF 5xxx

or BIOC 5xxx

or BIOC 6xxx

or BIOC 8xxx

or BIOL 5xxx

or BIOL 6xxx

or BIOL 8xxx

or BMEN 5xxx

or BMEN 8xxx

or BMSC 8xxx

or BTHX 5xxx

or BTHX 8xxx

or CGSC 8xxx

or CHEM 5xxx

or CHEM 8xxx

or CLS 5xxx



or CLS 8xxx  
or CMB 5xxx  
or CMB 8xxx  
or ECHO 4xxx  
or ECP 5xxx  
or ECP 8xxx  
or EEB 5xxx  
or EEB 8xxx  
or GCD 5xxx  
or GCD 6xxx  
or GCD 8xxx  
or HINF 5xxx  
or HINF 8xxx  
or MATH 5xxx  
or MATH 8xxx  
or MCDG 8xxx  
or MEDC 5xxx  
or MEDC 8xxx  
or MICA 8xxx  
or NSC 5xxx  
or NSC 8xxx  
or NSCI 5xxx  
or NSCI 6xxx  
or NURS 5xxx  
or NURS 6xxx  
or NURS 7xxx  
or NURS 8xxx  
or PHAR 5xxx  
or PHAR 6xxx  
or PHAR 7xxx  
or PHCL 5xxx  
or PHCL 8xxx  
or PHM 5xxx  
or PHM 6xxx  
or PHM 8xxx  
or PHSL 5xxx  
or PHSL 6xxx  
or PHSL 8xxx  
or PUBH 5xxx  
or PUBH 6xxx  
or PUBH 7xxx  
or PUBH 8xxx  
or SAPH 5xxx  
or SAPH 8xxx  
or SCB 5xxx  
or SCB 8xxx  
or SCIC 8xxx  
or STAT 5xxx  
or STAT 8xxx  
or TXCL 5xxx  
or TXCL 8xxx  
or VMED 5xxx  
or VMED 8xxx

#### **Thesis Credits**

Take exactly 24 credit(s) from the following:

- [ECP 8888](#) - Thesis Credit: Doctoral (1.0 - 24.0 cr)

#### **Focus Areas**

##### **Pharmacometrics (9 credits)**

Coursework chosen from the following list, or other courses to meet the 9-credit focus area requirement, are selected in consultation with the advisor.

[ECP 8500](#) - Advances in Pharmacometrics Modeling and Simulation (1.0 cr)

or [ECP 8501](#) - Pharmacometrics (2.0 cr)

or [ECP 8502](#) - Introductory Population Pharmacokinetic Methods (2.0 cr)



or [ECP 8503](#) - Intermediate Population PK/PD Methods (2.0 cr)  
or [ECP 8504](#) - Modeling Biologics (2.0 cr)  
or [ECP 8505](#) - Application of physiological-based pharmacokinetic modeling(PBPK) to model-informed drug development (2.0 cr)  
or [ECP 8506](#) - Clinical Trial Simulation (2.0 cr)  
or [PUBH 7420](#) - Clinical Trials: Design, Implementation, and Analysis (3.0 cr)  
or [PUBH 7430](#) - Statistical Methods for Correlated Data (3.0 cr)  
or [PUBH 7440](#) - Introduction to Bayesian Analysis (3.0 cr)  
or [PUBH 7450](#) - Survival Analysis (3.0 cr)  
or [STAT 5101](#) - Theory of Statistics I (4.0 cr)  
or [STAT 5102](#) - Theory of Statistics II (4.0 cr)

-OR-

#### **Neuroscience/Neuropharmacology (9 credits)**

Coursework chosen from the following list, or other courses to meet the 9-credit focus area requirement, are selected in consultation with the advisor.

[NSC 5461](#) - Cellular and Molecular Neuroscience (3.0 cr)  
or [NSCI 5501](#) - Neurodegenerative Diseases, Mechanisms to Therapies (3.0 cr)  
or [PUBH 6450](#) - Biostatistics I (4.0 cr)  
or [PUBH 6451](#) - Biostatistics II (4.0 cr)  
or [PUBH 7420](#) - Clinical Trials: Design, Implementation, and Analysis (3.0 cr)

#### **or Neuro-Immune Interactions**

[CMB 8361](#) - Neuro-Immune Interactions (3.0 cr)  
or [NSC 8026](#) - Neuro-Immune Interactions (3.0 cr)  
or [PHCL 8026](#) - Neuro-Immune Interactions (3.0 cr)

#### **or Advanced Neuropharmaceutics**

[CMB 8481](#) - Advanced Neuropharmaceutics (4.0 cr)  
or [NSC 8481](#) - Advanced Neuropharmaceutics (4.0 cr)  
or [PHM 8481](#) - Advanced Neuropharmaceutics (4.0 cr)

-OR-

#### **Infectious Diseases (9 credits)**

Coursework chosen from the following list, or other courses to meet the 9-credit focus area requirement, are selected in consultation with the advisor.

[ECP 5620](#) - Drug Metabolism and Disposition (3.0 cr)  
or [MICA 8002](#) - Structure, Function, and Genetics of Bacteria and Viruses (4.0 cr)  
or [MICA 8003](#) - Immunity and Immunopathology (4.0 cr)  
or [MICA 8010](#) - Microbial Pathogenesis (3.0 cr)  
or [PHAR 6224](#) - Advanced Pharmacogenomics and Precision Medicine (2.0 cr)  
or [PUBH 6450](#) - Biostatistics I (4.0 cr)  
or [PUBH 6451](#) - Biostatistics II (4.0 cr)  
or [PUBH 7420](#) - Clinical Trials: Design, Implementation, and Analysis (3.0 cr)

-OR-

#### **Pharmacogenomics (9 credits)**

Coursework chosen from the following list, or other courses to meet the 9-credit focus area requirement, are selected in consultation with the advisor.

[ECP 5620](#) - Drug Metabolism and Disposition (3.0 cr)  
or [ECP 8900](#) - Advanced Topics in Experimental and Clinical Pharmacology (1.0 - 4.0 cr)  
or [GCD 4034](#) - Molecular Genetics and Genomics (3.0 cr)  
or [GCD 4143](#) - Human Genetics and Genomics (3.0 cr)  
or [GCD 8073](#) - Genetics & Genomics in Human Health (2.0 cr)  
or [PHAR 6224](#) - Advanced Pharmacogenomics and Precision Medicine (2.0 cr)  
or [PUBH 6381](#) - Genetics in Public Health in the Age of Precision Medicine (2.0 cr)  
or [PUBH 6450](#) - Biostatistics I (4.0 cr)  
or [PUBH 6451](#) - Biostatistics II (4.0 cr)  
or [PUBH 7420](#) - Clinical Trials: Design, Implementation, and Analysis (3.0 cr)