Pharmaceutical Sciences

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Department of Pharmaceutical Sciences (MC 781)
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pharmacy.uic.edu/programs/graduate-programs/phd-programs/phd-in-pharmaceutical-sciences

Administration:
Head of the Department: Nancy Freitag
Director of Graduate Studies: Terry Moore

Program Codes:
20FS5750MS (MS)
20FS5750PHD (PhD)

The Department of Pharmaceutical Sciences offers work leading to degrees in Pharmaceutical Sciences. Course work and research are available in the areas of discovery, development, and formulation of biologically active agents for therapeutic applications. The program is focused on the following areas: Pharmaceutics and Drug Delivery, Pharmacognosy, Chemistry in Drug Discovery, Molecular Mechanisms and Therapeutics, and Forensics.

Note: These graduate degrees are research degrees, not practice degrees. Students who wish to apply to the professional degree program in Pharmacy, see requirements for the UIC Doctor of Pharmacy (PharmD) program.

The Department of Pharmaceutical Sciences also participates in a joint PharmD/PhD program.

Admission and Degree Requirements

- MS in Pharmaceutical Sciences (See listing for PhD in Pharmaceutical Sciences)\(^a\)
- PhD in Pharmaceutical Sciences

\(^a\) This department only admits students to the PhD program or gives admission preference to PhD-seeking students.

- Biopharmaceutical Sciences (p. 1)
- Medicinal Chemistry (p. 3)
- Pharmaceutical Sciences (p. 3)
- Pharmacognosy (p. 4)

Biopharmaceutical Sciences

BPS 421. Advanced Dosage Form Design [Compounding]. 1 hour.
Students attend five recitations and ten labs where they make twenty new dosage formulations. Several dosage formulations are of veterinary products used to treat diseases in dogs, cats, horses, cattle and other large animals. Course Information: Prerequisite(s): PHAR 321 and PHAR 322.

BPS 430. Principles of Toxicology. 2 hours.
Examines the toxic effects of drugs and chemicals on organ systems. Lectures emphasize basic principles, effects on specific organ systems, major classes of toxic chemicals, and specialized topics such as forensic and industrial toxicology. Course Information: Same as PCOL 430. Credit is not given for BPS 430 if student has credit for EOH 457.

BPS 494. Special Topics of Current Interest in Biopharmaceutical Sciences. 1-3 hours.
Courses offered by faculty or a visiting Lecturer on a current topic of selected interest. Topics are available on an experimental basis for one offering only. Course Information: May be repeated to a maximum of 6 hours. Prerequisite(s): Consent of the instructor; good academic standing as defined by UIC policies.

BPS 506. Industrial Experience. 4-10 hours.
Recommended to graduate students with no industrial experience. Students spend time working in the pharmaceutical, imaging or cosmetic industry under academic supervision to obtain practical experience. Course Information: Satisfactory/Unsatisfactory grading only.

BPS 507. Drug Discovery, Design and Development. 3 hours.
Overview of drug development process from target identification and screening through clinical trials and FDA evaluation. Course Information: Same as MDCH 507 and PMPG 507.

BPS 508. Concepts in Drug Development: From Bench to Bedside. 3 hours.
Designed to give clinicians an overview of the drug development process from bench to bedside. Emphasis will be placed on the regulatory aspects of drug development including clinical trials, FDA approval and post marketing surveillance. Course Information: Offered online only. Prerequisite(s): Consent of the instructor.

BPS 510. Principles of Interfacial Phenomena. 3 hours.
Quantitative and theoretical principles of physical and chemical sciences as applied to pharmacy. Thermodynamics, kinetics, colloid and surface chemistry in evaluation of pharmaceutical formulations. Course Information: Prerequisite(s): MATH 480.

BPS 518. Advanced Drug Delivery Systems. 2 or 3 hours.
Controlled drug delivery systems utilizing polymers, synthesis of different types of devices, and the delivery expected from these devices, and mathematical modeling of delivery systems. Course Information: Same as BIOC 518. Prerequisite(s): Consent of the instructor.

BPS 542. Pharmacodynamics of Substance Abuse. 2 hours.
Considers the mechanisms of action, responses, pharmacokinetics and dependence factors of substance abuse. Emphasis will be placed on research strategies in studying the biological aspects of drug abuse. Course Information: Prerequisite(s): Consent of the instructor and a course in basic pharmacology.

BPS 545. Advanced Pharmacokinetics. 3 hours.
Kinetics of absorption, distribution, metabolism and excretion of drugs factors affecting these kinetics and their relationship to pharmacodynamics. Course Information: Prerequisite(s): Consent of the instructor.
BPS 570. Foundations of Forensic Toxicology. 2 hours.
Survey of forensic toxicology, with emphasis on analytical and interpretive aspects; unique characteristics, underlying philosophies, ethics; analytical methods, nontraditional matrices, interpreting the significance of results. Course Information: Prerequisite(s): Consent of the instructor.

BPS 573. Drug Identification Chemistry. 4 hours.
In-depth treatment of classes of commonly encountered drugs of abuse and the analytical methods used in their screening, identification and quantitation. Course Information: Prerequisite(s): Consent of the instructor. Class Schedule Information: To be properly registered, students must enroll in one Laboratory and one Lecture.

BPS 574. Forensic Toxicology. 4 hours.
In-depth treatment of techniques used in forensic toxicology, including specimen preparation, drug or toxin isolation, and analytical methods for screening, identification and quantitation; interpretation, reporting and testifying as to results. Course Information: Prerequisite(s): Consent of the instructor. Class Schedule Information: To be properly registered, students must enroll in one Laboratory and one Laboratory.

BPS 580. Forensic Science: Survey and Foundations. 2 hours.
Survey course for forensic sciences with emphasis on criminalistics; unique characteristics, underlying philosophies; nature, analytical methods, significance of results with chemical, biological, trace, pattern evidence. Course Information: Same as CLJ 580. Prerequisite(s): Approval of the department.

BPS 581. Forensic Analysis of Biological Evidence. 4 hours.
Forensic blood and physiological fluid identification; DNA typing of biological evidence; report writing; expert testimony. Course Information: Prerequisite(s): Consent of the instructor. Class Schedule Information: To be properly registered, students must enroll in one Laboratory and one Lecture.

BPS 582. Forensic Chemistry and Trace Evidence Analysis. 4 hours.
Trace evidence: hairs, fibers, glass, soil, paint and miscellaneous; nature, chemical, instrumental, microscopical methods of analysis; interpretation and significance of trace similarities; expert testimony. Course Information: Prerequisite(s): Consent of the director of graduate studies. Class Schedule Information: To be properly registered, students must enroll in one Laboratory and one Lecture.

BPS 583. Physical Pattern Evidence Analysis. 4 hours.
Pattern evidence: individualization, reconstruction; fingerprint classification; questioned documents; handwriting comparison; firearms and toolmarks comparisons; scene patterns and reconstruction will be studied in depth. Course Information: Prerequisite(s): Consent of the instructor. Class Schedule Information: To be properly registered, students must enroll in one Laboratory and one Lecture.

BPS 584. Forensic Drug Analysis and Toxicology. 4 hours.
Analysis of commonly abused drugs in their solid-dosage form and in biological media, with emphasis on modern instrumental methods and interpretation of results. Course Information: Prerequisite(s): Consent of the instructor. Class Schedule Information: To be properly registered, students must enroll in one Laboratory and one Lecture.

BPS 585. Ethical, Quality, Practice, and Legal Issues in Forensic Science. 3 hours.
A topical presentation-discussion of ethical, quality control, admissibility and practice topics emanating from the law-science interface integral to forensic sciences.

BPS 586. Topics in Specialty Forensic Examinations. 1-4 hours.
Topics may vary but will revolve around specialty forensic examinations, covering specific evidentiary classes (e.g. drug identification, DNA typing, fingerprints), including forensic laboratory methods, approaches and data interpretation. Course Information: May be repeated if topics vary. Students may register in more than one section per term. Prerequisite(s): BPS 581 or BPS 582 or BPS 583 or BPS 584; and consent of the instructor. Students must have credit in the forensic science program core course that covers the specific topic.

BPS 587. Forensic Science Seminar. 1 hour.
Weekly seminar series on forensic science research and topics, especially those outside the core requirements. Presentations by students, faculty, and guests. Course Information: Satisfactory/Unsatisfactory grading only. May be repeated. Prerequisite(s): Graduate or professional standing.

BPS 588. Expert Witness Testimony and Courtroom Demeanor. 3 hours.
Trials, hearings, grand jury; expert versus lay witness; personal and behavioral characteristics on the stand; results, reports and courtroom testimony; simulated trial testimony. Course Information: Prerequisite(s): Approval of the department.

BPS 589. Special Topics in Forensic Science. 3 hours.
Content may vary but will revolve around the philosophic, moral, and managerial problems associated with criminalistics practice. Topics may include evidence collection, analysis, reporting, and testimony to non-criminalistics fields. Course Information: Same as CLJ 589. May be repeated if topics vary. Prerequisite(s): Consent of the instructor.

BPS 590. Forensic Science Residency. 1-8 hours.
In-depth training for casework analysis in a specific forensic discipline (e.g. drug identification, DNA typing, fingerprints) in an approved forensic science laboratory. Course Information: Satisfactory/Unsatisfactory grading only. May be repeated to a maximum of 24 hours. Prerequisite(s): BPS 581 or BPS 582 or BPS 583 or BPS 584; and consent of the instructor. Students must have credit in the forensic science program core course that covers the specific topic.

BPS 591. Topics in Forensic Microscopy. 1-4 hours.
Topic may vary but will revolve around microscopical characterization of various materials, with emphasis on forensic laboratory methods and approaches, and interpretation of materials comparisons as evidence. Course Information: May be repeated if topics vary. Students may register in more than one section per term. Prerequisite(s): BPS 582 and consent of the instructor.

BPS 592. Forensic Science Internship. 2-4 hours.
Placement in a forensic science or toxicology laboratory or setting, under the supervision of a faculty member, with an accepted research project or paper required. Course Information: May be repeated to a maximum of 4 hours. Students may register in more than one section per term. Prerequisite(s): BPS 580; and consent of the instructor and a minimum of 15 hours of credit earned in the M.S. in Forensic Science program.

BPS 593. Research in Biopharmaceutical Sciences. 0-16 hours.
Research in biopharmaceutical sciences with the guidance of a faculty mentor. Course Information: Satisfactory/Unsatisfactory grading only. May be repeated. Prerequisite(s): Approval of the department.


**BPS 595. Departmental Seminar. 1-2 hours.**
Weekly seminar series on research and experimental techniques in biopharmaceutical sciences. Also consists of journal club at which students will present an article once a year. Course Information: Satisfactory/Unsatisfactory grading only. May be repeated. Weekly seminar and journal club meet separately from one another. Prerequisite(s): Approval of the department.

**BPS 596. Independent Study in Forensic Science. 1-8 hours.**
Supervised projects may consist of extensive reading or laboratory work, or both, on topics not covered in regular course offerings. Research undertaken for this course may not duplicate that being done for BPS 597 or BPS 598. Course Information: Satisfactory/Unsatisfactory grading only. May be repeated. Students may register in more than one section per term. Prerequisite(s): Approval of the instructor.

**BPS 597. Forensic Science Project Research. 3 hours.**
Supervised research in forensic science; a research project to be designed and completed within one semester. Course Information: Satisfactory/Unsatisfactory grading only. Prerequisite(s): BPS 580; and at least the core course in the M.S. in Forensic Science program covering the subject area in which the research is to be conducted and consent of the instructor.

**BPS 598. M.S. Thesis Research. 0-16 hours.**
For students doing M.S. thesis research or thesis writing. Course Information: Satisfactory/Unsatisfactory grading only. May be repeated to a maximum of 10 hours. A minimum of 6 hours is required. Prerequisite(s): Consent of the instructor.

**BPS 599. Dissertation Research. 0-16 hours.**
Ph.D. thesis research. Course Information: Satisfactory/Unsatisfactory grading only. May be repeated. Prerequisite(s): Consent of the instructor.

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**Medicinal Chemistry**

**MDCH 507. Drug Discovery, Design and Development. 3 hours.**
Overview of drug development process from target identification and screening through clinical trials and FDA evaluation. Course Information: Same as BPS 507 and PMPG 507.

**MDCH 595. Seminar in Medicinal Chemistry. 1 hour.**
Presentation on a current research topic. Course Information: Satisfactory/Unsatisfactory grading only.

**MDCH 598. Master's Research in Medicinal Chemistry. 0-16 hours.**
Thesis research to fulfill master's degree requirements. Course Information: Satisfactory/Unsatisfactory grading only.

**MDCH 599. Doctoral Research in Medicinal Chemistry. 0-16 hours.**
Research for doctoral students. Course Information: Satisfactory/Unsatisfactory grading only.

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**PSCI 425. College of Pharmacy Colloquium Lecture Series. 1 hour.**
Weekly, one-hour, basic-research seminars given by invited lecturers. Course Information: Previously listed as BPS 425. May be repeated for a maximum of 2 hours. Students will not be able to concurrently enroll in PSCI 425 and PMPR 355 during the Spring semester.

**PSCI 499. Special Projects in Pharmaceutical Sciences. 1-3 hours.**
Special projects in Pharmaceutical Sciences. Course Information: Previously listed as PMPG 499.

**PSCI 501. Drug Discovery, Design, and Development. 3 hours.**
Provides an overview of the process to discover, design, develop, and market drugs set in the background of chemistry and biology. Course Information: Credit is not given for PSCI 501 if the student has credit in BPS 507 or MDCH 507 or PMPG 507.

**PSCI 502. Training in Research Presentation. 1 hour.**
Provides practice and practical guidance for giving a high quality research seminar. Course Information: Satisfactory/Unsatisfactory grading only. Previously listed as MDCH 593.

**PSCI 503. Biostatistics for Pharmaceutical Scientists. 2 hours.**
Provides an introduction to basic statistical methods for pharmaceutical scientists. Course Information: Extensive computer use required. Credit is not given for PSCI 503 if the students has credit in BSTD 400.

**PSCI 504. Science Writing and Storytelling. 1 hour.**
Designed to use storytelling to write and communicate science more effectively. Course Information: Satisfactory/Unsatisfactory grading only. Extensive computer use required. Meets eight weeks of the semester. Prerequisite(s): Consent of the instructor.

**PSCI 510. Principles of Pharmaceutics and Drug Delivery. 3 hours.**
Provides fundamental principles of pharmaceutics and drug delivery. Course Information: Credit is not given for PSCI 510 if the student has credit in BPS 501.

**PSCI 519. Principles of Polymeric Science and Engineering. 3 hours.**
Intermediate polymer science, thermodynamics of polymer solutions, phase separations, MW determination, crystallization, elasticity, kinetics and processing. Course Information: Previously listed as BPS 522. Prerequisite(s): MATH 220; or consent of the instructor.

**PSCI 520. Research Techniques in Pharmacognosy. 3 hours.**
Provides an introduction to the techniques used in pharmacognosy research. Course Information: Previously listed as PMPG 510.

**PSCI 521. Structure Elucidation of Natural Products. 3 hours.**
Provides an in-depth study of structure elucidation and dereplication of a natural product using modern computational methods and real-life examples. Course Information: Previously listed as PMPG 516. Prerequisite(s): MDCH 562; or consent of the instructor.

**PSCI 522. Advanced Pharmacognosy. 3 hours.**
Provides an in-depth knowledge of the occurrence, biosynthesis and activity profile of biologically active natural products from plants, marine and microbial sources. Course Information: Previously listed PMPG 511. Prerequisite(s): Credit or concurrent registration in PSCI 520; or consent of the instructor or equivalent course.

**PSCI 523. Special Projects in Pharmaceutical Sciences. 1-3 hours.**
Overview of current research topics of interest in Pharmaceutical Sciences. Course Information: Previously listed as PMPG 565. Prerequisite(s): Completion of the first year of the program.

**PSCI 530. Principles of Medicinal Chemistry. 5 hours.**
Introduces concepts of graduate organic and physical organic chemistry as they relate to medicinal chemistry. Emphasis will be made on those topics of chemistry that are relevant to drug discovery and design. Course Information: Previously listed as MDCH 561. Prerequisite(s): Credit or concurrent registration in PHAR 422; or consent of the instructor. Recommended background: One year of organic chemistry with laboratory.
PSCI 531. Spectroscopy in Pharmaceutical Sciences. 3 hours.
The fundamental principles used to determine structure and conformation in molecules, emphasizing spectroscopic methods useful in solving structural problems and in analyzing dynamic biological processes. Course Information: Previously listed as MDCH 562. Prerequisite(s): Consent of the instructor or one year of physical chemistry.

PSCI 532. Organic Medicinal Chemistry. 3 hours.
Organic reactions are discussed in terms of their mechanisms and utility in the field of medicinal chemistry, particularly in the synthesis of medicinal agents. Course Information: Previously listed as MDCH 560. Credit is not given for PSCI 532 if the student has credit in MDCH 560. Prerequisite(s): One year of organic chemistry with laboratory.

PSCI 533. Drug Design. 2 hours.
Quantitative structure-activity relationships, computer graphics, molecular modeling and simulation, and chemometrics as applied to drug design and discovery. Course Information: No credit is given for PSCI 533 if the student has credit in MDCH 572. Previously listed as MDCH 572. Prerequisite(s): MDCH 561 or PSCI 530.

PSCI 541. Pharmaceutical Applications of Genomics. 2 hours.
Introduction to genomics for advanced pharmacy and graduate students. Principles of DNA sequencing and gene expression in human and microbial genomes, with emphasis on diagnostics and therapeutic applications. Course Information: Previously listed as PMMP 412. Prerequisite(s): PHAR 423 or consent of the instructor.

PSCI 591. Internship in Pharmaceutical Sciences. 1-12 hours.
Students spend time working in an entity unaffiliated with the department, such as an industrial or specialized laboratory, to obtain professional experience in a field of pharmaceutical sciences. Course Information: Satisfactory/Unsatisfactory grading only. May be repeated. Prerequisite(s): Consent of the instructor.

PSCI 592. Research Rotation in Pharmaceutical Sciences. 1-2 hours.
Research rotation course in which first year students from the Pharmaceutical Sciences program will undertake projects in laboratories affiliated with this program. Course Information: May be repeated to a maximum of 4 hours. Students may register for more than one section per term. Meets eight weeks of the semester. To be taken fall and spring semesters of the first year of graduate study. Prerequisite(s): Consent of the instructor.

PSCI 594. Special Topics in Pharmaceutical Sciences. 1-4 hours.
Covers at least one of the five concentrations of research in pharmaceutical sciences: pharmaceutics & drug delivery, pharmacognosy, chemistry in drug discovery, molecular mechanisms and therapeutics, and forensics. Course Information: May be repeated to a maximum of 4 hours if topics vary. Previously listed as MDCH 594. Prerequisite(s): One year of physical chemistry and one semester of biochemistry or consent of the instructor.

PSCI 598. Master's Thesis Research. 0-16 hours.
Independent research project under the guidance of an advisor. Course Information: Satisfactory/Unsatisfactory grading only. May be repeated. Prerequisite(s): Consent of the instructor.

Independent dissertation research under the guidance of an advisor and committee. Course Information: Satisfactory/Unsatisfactory grading only. May be repeated. Prerequisite(s): Consent of the instructor.