

# PHARMACEUTICAL SCIENCES

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Chairperson: Steven Firestine

<https://cphs.wayne.edu/sciences/index.php> (<https://cphs.wayne.edu/sciences/>)

The pharmaceutical sciences encompass the traditional disciplines of medicinal or pharmaceutical chemistry, pharmaceuticals and pharmacology/toxicology. Medicinal chemistry is primarily devoted to the discovery and development of new compounds which may be of value in the diagnosis and treatment of disease. Included are applications of organic chemistry, natural product chemistry, biochemistry, pharmacology and the relationships among chemical structure, physical properties and biological activity. Pharmaceuticals is concerned with the conception, design, production, characterization, and evaluation of drug delivery systems in vitro and in vivo. Pharmaceuticals includes physical, chemical, biological, microbiological and engineering studies related to the design of drug delivery systems. Pharmacology/toxicology deals with the principles and mechanisms of drug action on biological systems and the toxicological aspects of drugs and other substances.

Applicants with a strong background in the behavioral, biological, pharmacy and/or the physical sciences are excellent candidates for graduate work in this department. Study within this department is heavy focused on an interdisciplinary approach and the curriculum involves a single major with specializations rather than separate majors. This leads to greater flexibility in designing individualized programs geared to the applicant's preparation and interests.

ABRAMSON, HANLEY N.: Ph.D., University of Michigan; B.S., Wayne State University; Professor Emeritus

BEDI, MEL: Ph.D., University of Toledo; Pharm.D., University of Toledo; B.S., University of Toledo; B.S., Indiana State University; Assistant Professor (Research)

BRYANT-FRIEDRICH, AMANDA: Ph.D., Ruprecht-Karls Universität; M.S., Duke University; Professor

COMMISSARIS, RANDALL L.: Ph.D., Michigan State University; B.S., Alma College; Associate Professor

CORCORAN, GEORGE B.: Ph.D., George Washington University; M.S., Bucknell University; B.A., Ithaca College; Professor Emeritus

CUMMINGS, BRIAN: Ph.D., Wayne State University School; B.S., Eastern Michigan University; Professor and Dean

DUTTA, ALOKE K.: Ph.D., Ohio University; M.S., B.S., Calcutta University; Professor

FIRESTINE, STEVEN M.: Ph.D., Purdue University; B.S., University of Michigan; Professor and Chair

GAVANDE, NAVANTH: Ph.D., University of Sydney; M.S., National Institute of Pharmaceutical Education and Research; B.Pharm, S.G.R.S. College of Pharmacy; Assistant Professor

IYER, ARUN: Ph.D., Sojo University; M.S., B.S., University of Pune; Assistant Professor

JIANG, GUANGDE: Ph.D., University of Florida; M.S., China Pharmaceutical University; B.S., Xiangtan University; Assistant Professor

KOWLURU, ANJANEYULU: Ph.D., Indian Institute of Technology; M.S., Allahabad University; B.S., Andhra Loyola College; Distinguished Professor

LIPCHIK, ANDREW: Ph.D., Purdue University; B.S., Xavier University; Assistant Professor

LIU, WANQING: Ph.D., Shanghai Institute of Physiology, Chinese Academy of Sciences; Professor

MOSZCZYNSKA, ANNA B.: Ph.D., M.Sc., University of Toronto; M.S., B.Sc., Technical University; Associate Professor

PITTS, DAVID K.: Ph.D., M.S., Wayne State University; B.S., Michigan State University; Associate Professor

POKORSKI, PHILIP: Ph.D., M.S., B.S., Wayne State University; Assistant Professor - Clinical

STEMMER, PAUL M.: Ph.D., Michigan State University; B.S., University of Cincinnati; Professor

STEMMLER, TIMOTHY L.: Ph.D., University of Michigan; M.S., B.A., St. Louis University; Professor

WANG, JIEMEI: M.D., Ph.D., Sun Yat-Sen University; Associate Professor

WORMSER, HENRY C.: Ph.D., University of Wisconsin; M.S., B.S., Temple University; Professor Emeritus

YI, ZHENGPING: Ph.D., M.S., B.S., Nanjing University; Professor and Director, Graduate Program

ZHANG, XIANGMIN: Ph.D., M.S., Chinese Center for Disease Control and Prevention; B.Med., Henan Medical College; Assistant Professor (Research)

- Pharmacy (Pharm.D.) (<http://bulletins.wayne.edu/graduate/college-pharmacy-health-sciences/pharmacy-practice/pharmacy-pharmd/>)
- Pharmaceutical Sciences (M.S.) (<http://bulletins.wayne.edu/graduate/college-pharmacy-health-sciences/pharmaceutical-sciences/pharmaceutical-sciences-ms/>)
- Pharmaceutical Sciences (Ph.D.) (<http://bulletins.wayne.edu/graduate/college-pharmacy-health-sciences/pharmaceutical-sciences/pharmaceutical-sciences-phd/>)
- Pharmaceutical Sciences and Urban Sustainability (Ph.D. Dual-Title) (<http://bulletins.wayne.edu/graduate/college-pharmacy-health-sciences/pharmaceutical-sciences/pharmaceutical-sciences-urban-sustainability/>)

## PSC 4115 Pharmaceutics I Cr. 3

Introduction to pure drug substance formulation into dosage forms and the principles and mechanisms for developing dosage forms for safe and effective use in patients. Offered Fall.

**Restriction(s):** Enrollment limited to students in the Doctor of Pharmacy program.

## PSC 4125 Introduction to Pharmaceutical Sciences: Medicinal Chemistry / Pharmacology / Immunology Cr. 3

Introduction to medicinal chemistry, pharmacology and biotechnology with a focus on drug discovery and drug action. Offered Fall.

**Restriction(s):** Enrollment limited to students in the Doctor of Pharmacy program.

**PSC 4215 Pharmaceutics II Cr. 2**

Basic pharmacokinetics: principles of drug administration, distribution, metabolism and excretion (ADME) using different dosage forms, and basics of administration routes. Offered Winter.

**Restriction(s):** Enrollment limited to students in the Doctor of Pharmacy program.

**PSC 4225 Autonomic Pharmacology Cr. 2**

The principles of autonomic pharmacology integrated into an understanding of the functioning of the autonomic system; the major target organs and the physiological effects of agonists and antagonists elicited through autonomic receptor subtypes. Offered Winter.

**Prerequisite(s):** PSC 4125

**Restriction(s):** Enrollment limited to students in the Doctor of Pharmacy program.

**PSC 5115 Pharmacokinetics Cr. 2**

Conceptual knowledge-base and practical calculation applications of pharmacokinetic principles. Offered Fall.

**Restriction(s):** Enrollment limited to students in the Doctor of Pharmacy program.

**PSC 5600 Drugs of Abuse Cr. 2**

Pharmacology and toxicology, both clinical and animal, associated with recreationally-used agents; treatment of acute and chronic problems associated with these agents; concept of chronic drug administration and abuse as disease state. Offered Yearly.

**Restriction(s):** Enrollment limited to students in the Pharmacy and Health Sciences.

**PSC 5870 Seminar in Pharmacology Cr. 1**

Reports and discussions on current literature and recent advances in the field. Assigned topics presented by students. Offered for undergraduate credit only. Offered Every Term.

**Restriction(s):** Enrollment limited to students in the Pharmacy and Health Sciences.

**Repeatable for 2 Credits**

**PSC 5990 Directed Study in Medicinal Chemistry Cr. 2**

Offered for undergraduate credit only. Offered Every Term.

**Restriction(s):** Enrollment limited to students in the Pharmacy and Health Sciences.

**PSC 5991 Directed Study in Pharmaceutics Cr. 2**

Offered for undergraduate credit only. Offered Every Term.

**Restriction(s):** Enrollment limited to students in the Pharmacy and Health Sciences.

**PSC 5992 Directed Study in Pharmacology Cr. 2**

Offered for undergraduate credit only. Offered Every Term.

**Restriction(s):** Enrollment limited to students in the Pharmacy and Health Sciences.

**PSC 6285 Pharmacy Seminar Cr. 1**

Presentations on topics of current interest on basic science problems relevant to the major discipline of pharmaceutical sciences. Offered Winter.

**Restriction(s):** Enrollment limited to students in the Doctor of Pharmacy program.

**PSC 6620 Veterinary Pharmacology Cr. 2**

Provides an overview of veterinary pharmacology that offers a review of the chemical structure, mechanism of action, indications for use, and side effects of therapeutics. Includes topics such as toxicology, laws and regulations and common diseases/conditions of veterinary species. Offered Fall.

**Restriction(s):** Enrollment limited to students in the Doctor of Pharmacy program.

**PSC 6800 Introduction to Research Cr. 2**

Fundamental concepts and resources for responsible conduct of biomedical research and advancing scientific professional development, and data analysis and statistics. Offered Yearly.

**Restriction(s):** Enrollment limited to students in the Pharmacy and Health Sciences.

**PSC 6890 Toxicology for Pharmacists Cr. 2**

Exposes students to basic concepts in toxicology; serves as a knowledge base to assist in the understanding of mechanisms and rationale behind the relationship of certain drugs and their specific types of toxicities, and addresses tissue and organ-specific toxicities, drug-drug interactions, on-target and off-target effects, and risk assessment. Offered Winter.

**Restriction(s):** Enrollment limited to students in the Pharmacy and Health Sciences.

**PSC 6910 Pharmaceutical Waste: Environmental Impact and Management Cr. 2-3**

Course designed for advanced professional and graduate students with sufficient chemistry and/or biological sciences background who are interested in the environmental impact, management, and regulation of waste pharmaceuticals as emerging issues. Offered Winter.

**Restriction(s):** Enrollment is limited to Graduate or Professional level students.

**Equivalent:** CE 6910

**PSC 7001 Survey of Pharmaceutical Sciences Cr. 3**

The basic principles of pharmaceutical science are covered via an introduction in three major disciplines: medicinal chemistry, pharmaceutics, and pharmacology. Offered Fall.

**Restriction(s):** Enrollment is limited to Graduate level students.

**PSC 7010 Advanced Drug Action and Safety I Cr. 3**

Survey of advanced research topics in pharmacology. Offered Fall.

**Restriction(s):** Enrollment is limited to Graduate or Professional level students; enrollment limited to students in the Pharmacy and Health Sciences.

**PSC 7020 Advanced Drug Discovery I Cr. 3**

Survey of advanced research topics in medicinal chemistry. Offered Winter.

**Restriction(s):** Enrollment is limited to Graduate or Professional level students; enrollment limited to students in the Pharmacy and Health Sciences.

**PSC 7040 Advanced Drug Formulation and Delivery I Cr. 3**

Survey of advanced research topics in pharmaceutics. Offered Winter.

**Restriction(s):** Enrollment is limited to Graduate or Professional level students; enrollment limited to students in the Pharmacy and Health Sciences.

**PSC 7160 Advanced Practice Basic Pharmaceutical Sciences Elective Cr. 3-6**

Eight-week rotation in basic science-oriented research laboratory. Offered Intermittently.

**Restriction(s):** Enrollment is limited to Graduate or Professional level students; enrollment limited to students in the Pharmacy and Health Sciences.

**Repeatable for 6 Credits**

**PSC 7777 Chemistry Biology Interface Seminar Series Cr. 1**

The Chemistry Biology Interface (CBI) seminar series will expose students to CBI-related research, CBI-related professional development activities, review of current literature, topics in rigor and reproducibility, and networking social activities. These activities will be in the format of presentations, panel discussions, workshops, small group discussions, or social activities. The goal is for graduate students from discipline-specific fields to move across a multi-disciplinary landscape, or for students already working in inter-disciplinary fields, such as chemical biology, to gain new expertise in specific disciplines. Beyond scholarly goals, the seminar series will enrich the graduate experience by providing career guidance, non-laboratory skill development, training in rigor and reproducibility, and professional networking. Offered Fall, Winter.

**Restriction(s):** Enrollment is limited to Graduate level students.

**Equivalent:** BIO 7777, CHM 7777

**PSC 7800 Research Techniques in Medicinal Chemistry Cr. 1-4**

Laboratory work employing modern techniques available in medicinal chemistry; application of basic principles to graduate study and research. Offered Every Term.

**Restriction(s):** Enrollment is limited to Graduate or Professional level students; enrollment limited to students in the Pharmacy and Health Sciences.

**Repeatable for 16 Credits**

**PSC 7810 Research Techniques in Pharmaceutics Cr. 1-4**

Laboratory work employing modern techniques available in pharmaceutics: application of basic principles to graduate study and research. Offered Every Term.

**Restriction(s):** Enrollment is limited to Graduate or Professional level students; enrollment limited to students in the Pharmacy and Health Sciences.

**Repeatable for 16 Credits**

**PSC 7820 Research Techniques in Pharmacology Cr. 1-4**

Laboratory work employing some of the modern techniques available in pharmacology, including the application of basic principles to graduate study and research. Offered Every Term.

**Restriction(s):** Enrollment is limited to Graduate or Professional level students; enrollment limited to students in the Pharmacy and Health Sciences.

**Repeatable for 16 Credits**

**PSC 7850 Pharmaceutical Sciences Colloquium Cr. 1**

This course is a required seminar course for all graduate students in the Department of Pharmaceutical Sciences. Offered Every Term.

**Restriction(s):** Enrollment is limited to Graduate or Professional level students; enrollment limited to students in the Pharmacy and Health Sciences.

**Repeatable for 10 Credits**

**PSC 7860 Introduction to Seminar Cr. 1**

A required seminar course for all first year graduate students in the Department of Pharmaceutical Sciences. Students will be required to present a seminar on their research progress during their first year in the program. Offered Every Term.

**Restriction(s):** Enrollment is limited to Graduate or Professional level students; enrollment limited to students in the Pharmacy and Health Sciences.

**PSC 7870 Second Year Seminar Cr. 1**

A required seminar course for all second year PhD students in the Department of Pharmaceutical Sciences. Students will be required to present a seminar on a topic unrelated to their research. Offered Fall, Winter.

**Prerequisites:** PSC 7860 with a minimum grade of C

**Restriction(s):** Enrollment is limited to Graduate level students.

**PSC 7880 Third Year Seminar Cr. 1**

A required seminar course for all third year PhD students in the Department of Pharmaceutical Sciences. Students will be required to present a seminar on their research. Offered Fall, Winter.

**Prerequisites:** PSC 7870 with a minimum grade of C

**PSC 7999 Master's Essay Direction Cr. 1-4**

Offered Every Term.

**Restriction(s):** Enrollment limited to students with a class of Candidate Masters; enrollment is limited to Graduate or Professional level students; enrollment limited to students in the Pharmacy and Health Sciences.

**Repeatable for 4 Credits**

**PSC 8650 Special Topics in Medicinal Chemistry Cr. 2**

Recent developments in medicinal chemistry. Topics under investigation and of current interest offered in different semesters. Offered Every Term.

**Restriction(s):** Enrollment is limited to Graduate or Professional level students; enrollment limited to students in the Pharmacy and Health Sciences.

**Repeatable for 16 Credits**

**PSC 8660 Special Topics in Pharmaceutics Cr. 2**

Recent developments in pharmaceutics. Topics under investigation and of current interest offered in different semesters. Offered Every Term.

**Restriction(s):** Enrollment is limited to Graduate or Professional level students; enrollment limited to students in the Pharmacy and Health Sciences.

**Repeatable for 16 Credits**

**PSC 8670 Special Topics in Pharmacology Cr. 2**

Recent developments in pharmacology. Topics under investigation and of current interest offered in different semesters. Offered Every Term.

**Restriction(s):** Enrollment is limited to Graduate or Professional level students; enrollment limited to students in the Pharmacy and Health Sciences.

**Repeatable for 16 Credits**

**PSC 8888 Survey of Research at the Chemistry Biology Interface Cr. 3**

The Chemistry Biology Interface course will teach students how to apply chemical approaches to study complete biological processes. It will commence with a basic overview of the biochemistry of biomolecules. Next, complex biological processes related to various diseases will be highlighted by introducing cell biology, model cells and organisms, and disease mechanisms. Finally, the course will highlight contemporary examples of how chemical methods are used to answer complex biological questions to show the value and innovation available by taking a multidisciplinary approach. The focus will be on development of skill sets that are applicable for research at the chemistry biology interface, rigor and transparency in data collection and analysis, and identification of cross-disciplinary research at Wayne State. Offered Winter.

**Restriction(s):** Enrollment is limited to Graduate level students.

**Equivalent:** BIO 8888, CHM 8888, PHC 8888, PSL 8888

**PSC 8999 Master's Thesis Research and Direction Cr. 1-8**

Offered Every Term.

**Restriction(s):** Enrollment limited to students with a class of Candidate Masters; enrollment is limited to Graduate or Professional level students; enrollment limited to students in the Pharmacy and Health Sciences.

**Repeatable for 8 Credits**

**PSC 9990 Pre-Doctoral Candidacy Research Cr. 1-8**

Research in preparation for doctoral dissertation. Offered Every Term.

**Restriction(s):** Enrollment is limited to Graduate or Professional level students; enrollment limited to students in the Pharmacy and Health Sciences.

**Repeatable for 12 Credits**

**PSC 9991 Doctoral Candidate Status I: Dissertation Research and Direction Cr. 3-9**

Offered Every Term.

**Restriction(s):** Enrollment is limited to Graduate or Professional level students; enrollment limited to students in the Pharmacy and Health Sciences.

**Repeatable for 9 Credits**

**PSC 9992 Doctoral Candidate Status II: Dissertation Research and Direction Cr. 1-18**

Offered Every Term.

**Restriction(s):** Enrollment is limited to Graduate or Professional level students; enrollment limited to students in the Pharmacy and Health Sciences.

**Repeatable for 18 Credits**

**PSC 9993 Doctoral Candidate Status III: Dissertation Research and Direction Cr. 7.5**

Offered Every Term.

**Restriction(s):** Enrollment is limited to Graduate or Professional level students; enrollment limited to students in the Pharmacy and Health Sciences.

**PSC 9994 Doctoral Candidate Status IV: Dissertation Research and Direction Cr. 7.5**

Offered Every Term.

**Restriction(s):** Enrollment is limited to Graduate or Professional level students; enrollment limited to students in the Pharmacy and Health Sciences.

**PSC 9995 Candidate Maintenance Status: Doctoral Dissertation Research and Direction Cr. 0**

Offered Every Term.

**Restriction(s):** Enrollment is limited to Graduate or Professional level students; enrollment limited to students in the Pharmacy and Health Sciences.

**Repeatable for 0 Credits**