R. Ken Coit College of Pharmacy

Pharmacy Undergraduate Courses – Fall 2025

All courses are available for registration via UAccess. Contact Rebecca Field at rmitch@arizona.edu with any registration questions. Interested in a College of Pharmacy major or minor? Contact a College of Pharmacy advisor for more information!

Fall 2025 course options include the following. Course details and times can be found below.

- PCOL 200 – Drugs & Humanity
- PCOL 300 – Pharmacology of Cosmetics & Self-Care Products
- PCOL 305 – Scientific Writing for Health Sciences
- PCOL 310 – Drug Approval: The 3 Billion Dollar Bet
- PCOL 313 – Pharmacological and Therapeutic Aspects of Longevity and Ageing
- PCOL 320 – What's Your Poison? Toxicology of the Substances that Surround Us
- PCOL 325 – Controversies in Healthcare Practice
- PCOL 355 – Drug Delivery Systems
- PCOL 390 – Biomarkers: Analysis of Drug Effect & Toxicity
- PCOL 396/416 – Special Topics in Pharmacy: Evolutionary Pharmacognosy (New course!)
- PCOL 406 – Comprehensive Human Pharmacology
- PCOL 405 – Current Techniques in Pharmaceutical Sciences
- PCOL 410 – Medicinal Chemistry
- PCOL 429 –Neuropsychopharmacology
- PCOL 436 – Cardiovascular Pharmacology
- PCOL 445 – Over-the-Counter Drug Information
- PCOL 465 – Infectious Disease Pharmacology

Elective Seminars (just for fun)

- PCOL 196D - The Joy of Drugs: An Introduction to Pharmaceutical Sciences
- PCOL 395B – The History of Pharmacy
- PCOL 395D – Exploring Careers in Pharmaceutical Sciences
- PCOL 396 – Special Topics in Pharmacy: Optimizing your Success in the PharmD Admission Process

PCOL 196D – The Joy of Drugs: An Introduction to Pharmaceutical Sciences (1 unit)

Wednesdays 3:00 – 3:50 PM **Instructor: Jennifer Schnellmann**

Elective – Open to all majors

This seminar will offer students who may be unfamiliar with the breadth and reach of pharmaceutical sciences as a discipline a timely and entertaining overview of this field. Topics will include an introduction to drug discovery and development, drug pricing and advertising, drug dosage forms and delivery vehicles, the science of drug efficacy and toxicity, pharmacokinetics and pharmacodynamics, a review of common drug classes (mechanism of action, indication, side effects), and the most problematic human diseases for which we have no cures (and why!). The series will conclude with hilarious stories about impromptu drug re-purposing when crazy side effects emerged. Taught using plain language and current cultural references, this course proves that you don't have to be a scientist to understand science. Open to all majors.

PCOL 200 –Drugs & Humanity (3 units)

Tues/Thurs 9:30 – 10:45AM **Instructor: Bernie Futscher**

PharmSci Required Core | **PharmTox Elective**

Drugs shape society. Drugs can prevent and cure mortal diseases and have dramatically increased human lifespan, thereby forever changing the fabric of society and civilization. Drugs have evolved alongside human inquiry and have informed many areas medicine, science, art, justice, and policy. The consequences of drug use or pharmacotherapy, intended and unintended, may alleviate pain and ward off death, while at the same time contribute to pain and death. Such are the complexities of small molecules ingested often in vanishingly small amounts. While the effects may appear magical, they are rooted in science, technology, engineering and mathematics.

This course uses examples of drugs that shaped humanity to examine the underlying biologic mechanisms and pharmacologic principles that underlie the drug's desired and undesired physiologic/psychologic effects. We will attempt to put these drugs in the historical context in which they emerged, how societal modernization provided the foundation for organized, reasoned drug development and the establishment of the pharmaceutical industry. As the course draws to a close, we will examine the likely pharmacologic agents and approaches that will impact society in the near future. No prerequisites, but some background in biology strongly encouraged.

PCOL 300 – Pharmacology of Cosmetics and Self-Care Products (3 units)

Fully Online – Honors and Non-Honors Available **Instructor: Jennifer Schnellmann**

PharmSci major elective | **PharmTox major elective**

Students will expand their knowledge of pharmaceutics, pharmacology, and toxicology and apply this information to an array of substances that they encounter or deliberately use daily. Students will also learn the regulatory aspects of cosmetic creation, advertising, and sale; the chemistry behind ingredient selection for each category of product; and the efficacy that can be expected due to the pharmacological and toxicological characteristics of these formulations. At the end of the course, students will be better-informed consumers, better equipped to select and purchase beauty and self-care products that deliver meaningful results, avoiding products of limited efficacy or which may be unsafe. Prerequisite: CHEM 152 (or equivalent).

PCOL 305 - Scientific Writing for Health Sciences (3 units)

Wednesdays 1:00 – 1:50 PM + online (hybrid course) **Instructor: Jennifer Schnellmann**

Required PharmSci core | **Required PharmTox core**

In this three-credit course, students will learn to read and interpret basic and clinical science papers and to write scientific manuscripts and research proposals. Emphasis will be placed on conveying the significance of research, outlining aims, and discussing results for scientific papers and grant proposals. Students will learn the traditional sections of a scientific paper (and why), how methods are used and presented, how results are communicated, and what a discussion contains (and does not). Best practices for figures and tables (data presentation) will be described and students will be shown how to craft an abstract from a work of literature. Next, students will learn what a research proposal contains (modeled after the R01) and how they are constructed. Students will also learn about peer-review and participate in drug information retrieval. Writing Emphasis Course. Prerequisite: ENGL 102, 108, or ENGL 109H and CHEM 151 (or equivalent). PharmSci majors and minors receive priority registration.

PCOL 310 – Drug Approval: The 3 Billion Dollar Bet (2 units)

Mon/Wed 10:00 – 10:50 AM LIVE ONLINE **Instructor: Beth Zerr**

Required PharmSci core

Almost 60 billion dollars are spent annually on pharmaceutical research and development in the United States and almost 425 billion dollars are spent annually in drug purchasing. Drugs are key economic and therapeutic factors in the health care arena; yet, among patients and consumers the pharmaceutical industry lacks public trust and the process of drug approval is often shrouded in mystery. In this course we'll address the decisions drug manufacturers consider, including time, cost, risk and value in bringing as new drug product to market. We will explore how a new drug product is developed from concept to bedside. Prerequisite: ENGL 102, 108, or ENGL 109H. PharmSci majors receive priority registration.

PCOL 313 - Pharmacological and Therapeutic Aspects of Longevity & Ageing (3 units)

Mondays 1:00 – 1:50 PM + online (hybrid course) **Instructor: Jennifer Schnellmann**

Honors and Non-Honors Options Available

PharmSci major elective | **PharmTox major elective**

In this course, students will learn how mainstream medicine is designed to keep us alive but not healthy. We will cover the main determinants of premature death and actual interventions that prevent or reverse these conditions, contrasting these approaches to the currently used and very poor therapies that simply keep people ill longer. We will address myths of ageing and the differences between centenarians and the rest of the population. Finally, we will cover diet, exercise, and drugs that can be deployed now to increase our lifespan as well as our health span. Prerequisites: MCB 181R and CHEM 152.

PCOL 320 – What's Your Poison? Toxicology of the Substances that Surround Us (3 units)

Mondays 2:00 – 2:50 PM + online (hybrid course) **Instructor: Jennifer Schnellmann**

Honors and Non-Honors Options Available

PharmSci major elective | **PharmTox Toxicology emphasis**

This course covers the toxicology of plants, fish, insects and reptiles, foods, drugs of abuse, and other common poisonous substances in addition to information about carcinogens, teratogens, and risk assessment. Students will learn about snake, spider, and scorpion venoms; marine toxins produced by exotic underwater creatures; and common food poisonings. We will cover non-food plant toxicities, drugs of abuse, approaches to risk assessment, compounds that cause cancer and birth defects, and more. Prerequisites: MCB 181R+181L and CHEM 151 (or equivalent).

PCOL 325 – Controversies in Healthcare (3 units)

Mondays 3:00 – 3:50 PM + online (hybrid course) OR
Wednesdays 2:00 – 2:50 PM + online (hybrid course)
Instructor: Jennifer Schnellmann

Honors and Non-Honors Options Available

Building Connection – Open to all majors

This course will allow students to explore the most controversial and timely topics in healthcare that are based in medicine and healthcare. We will cover specific drugs for lethal injection, euthanasia, pregnancy termination as well as human physical and cognitive enhancement. We will also focus on inconsistencies in drug applications such as social medication, disease mongering, and compassionate use of drugs for the terminally ill. In each session, we will cover the laws or policies involved, where they have been and where they are heading. Drug pricing, advertising, and black-market purchases will be described and we will end the session with unlawfully obtained patient data and transgender healthcare concerns. Topics are diverse and challenging, allowing students to see behind the curtain of medicine to visualize many of the struggles our providers face daily. Students will broaden their understanding of pharmacology (drug name, purpose, mechanism of action, and potential toxicity), current events, ethics, persuasive argument, and philosophical approaches to decisions about medicine and healthcare. No prerequisites.

PCOL 355: Drug Delivery Systems (3 units)

Tues/Thurs 2:00 – 3:15 PM
Instructor: Jianqin Lu

PharmSci sub-core

The purpose of this course is to provide the student with a basis of understanding of pharmaceutical dosage forms. An overview of traditional and novel dosage forms will be presented along with a discussion on scientific and regulatory requirements necessary to get a drug product approved. The course will emphasize the relationship between Physical Pharmacy (chemistry and physical science) and the pharmaceutical dosage form. Critical thinking and problem solving will be applied to the above principles. Prerequisites: CHEM 241B and 243B.

PCOL 390: Biomarkers – Analysis of Drug Effect & Toxicity (3 units)

Tues/Thurs 12:30 – 1:45 PM
Instructor: James Galligan

PharmSci sub-core

A biomarker is a defined characteristic that is measured as an indicator of normal biological processes, pathogenic processes, or responses to an exposure or intervention, including therapeutic interventions. These indicators may be molecular, histologic, radiographic, or physiologic characteristics. Biomarkers can be used in a variety of settings including basic, translational, and clinical research and in clinical practice settings. This course will provide an introduction to the exploration, validation, and application of biomarkers during the drug development process and in predicting and monitoring drug efficacy and safety during patient care. Key concepts in bioanalytical technologies used in biomarker measurements will also be introduced. The pathways for regulatory biomarker interpretation and acceptance will also be discussed. Prerequisites: PSIO 202 or 380, and CHEM 241A (or equivalent).

PCOL 395B – The History of Pharmacy (1 unit)

ONLINE
Instructor: Beth Zerr

Elective – Open to all majors

Pharmacy is a time-honored profession, dating back to ancient Mesopotamia. This seminar will explore pharmacy's rich history, and further students' understanding of the role that pharmacists, apothecaries, and medicinal healers have played over the centuries. A special emphasis will be placed on the history of pharmacy in the old west and Arizona territory. Course meetings will include frequent visits to the University of Arizona's own History of Pharmacy Museum. No prerequisites.

PCOL 395D – Exploring Careers in Pharmaceutical Science (1 unit)

Mondays 12:00 – 12:50 PM
Instructor: Bernard Futscher

Elective – Open to all majors

Pharmaceutical Sciences is a dynamic field that is critical to the discovery of new therapies and improvements in healthcare. But what do pharmaceutical scientists actually do? In this course, students will be exposed to a variety of professional pathways within the pharmaceutical sciences, including drug discovery, medicinal chemistry, toxicology, pharmacoeconomic, regulatory affairs, pharmaceutical sales, and more. Students will learn about the specific tasks associated with jobs in those fields and the type of course work needed in order to prepare for different types of work. Knowledge gained in this course may help students identify research areas in which they may pursue laboratory experience during their undergraduate program. No prerequisites.

PCOL 396 section 002 – Special Topics in Pharmacy: Evolutionary Pharmacognosy (3 units)

Mon/Wed 10-10:50AM (hybrid course) **Instructor: Kevin Scott**

PharmSci major elective

This course investigates the evolutionary origins of secondary metabolites across the tree of life and explores how these compounds shaped ecological interactions, animal behavior, and the rise of human pharmacology. We will trace the natural history of secondary metabolite biosynthetic pathways, explore the co-evolutionary arms races that gave rise to diverse natural product classes—including terpenes, phenolics, alkaloids, polyketides, glycosides, and nonribosomal peptides—and study how animals self-medicate (zoopharmacognosy) and humans developed traditional medicines based on these behaviors. Finally, we will investigate how the use of these compounds was shaped by the evolution of modern science, especially chemistry, leading ultimately to modern drug discovery and pharmaceutical science. This course will focus heavily on the structures, chemistry, and pharmacology of natural products. Prerequisites: CHEM 241B AND MCB 181R. Course should be renumbered to PCOL 416 by the start of the semester.

PCOL 396 section 101 - Special Topics in Pharmacy: Optimizing your Success in the PharmD Admission Process (1 unit)

ONLINE - FIRST-FIVE-WEEK SESSION **Instructor: Jeannie Lee**

Elective – Open to all majors

This course is designed for students planning to apply for Fall 2026 pharmacy school admission. The course provides a comprehensive review of the pharmacy school application process and aids students in the development of application materials including the personal statement, resume, and experiences section of the PharmCAS application. Students will be guided to leverage their skills, experiences, and academic prowess to optimize the impact of their application. Information about the various interview components and timed writing session will be provided and how to best prepare for them. Lectures are provided by experts in the pharmacy school admissions process, and students will have an opportunity to hear from clinical instructors, faculty, and current pharmacy students about their experiences. Students will obtain a complete understanding of the pharmacy school application process, as well as an overview of pharmacy education and careers. A Bachelor's degree is not required to apply to pharmacy school. No prerequisites, but designed for students who are applying for Fall 2026 PharmD admission.

PCOL 405 – Current Techniques in Pharmaceutical Science (3 units)

Monday/Thursday 4:00 – 5:15 PM **Instructor: Daekyu Sun**

PharmSci major elective

This co-convened team-taught course is offered by the faculty of the Department of Pharmacology and Toxicology and other invited speakers. This course will cover essential laboratory techniques that are used in the fields of medicinal chemistry, pharmacology, and pharmaceutics. The objective of this course is to provide students with practical knowledge and hands-on experience with some of the most common experimental methods used in the field of Drug Discovery and Development, Pharmacology, Toxicology, and Pharmaceutics. Laboratory techniques covered in this course include biochemical and molecular biological methods or procedures that are used to study living cells, analytical methods or procedures that are used in pharmacology, toxicology, and pharmaceutics, and preclinical in vitro and in vivo experimental models of drug metabolism and disposition in drug discovery and development. Prerequisites: CHEM 241B AND BIOC 384 or 385 AND MIC 205A.

PCOL 406: Comprehensive Human Pharmacology (5 units)

M/T/W/Th 4:00 – 5:05 PM **Instructor: George Watts**

Required PharmSci major core | **Required PharmTox major core**

Pharmacology is the study of how drugs change human physiology to prevent disease and to reduce/remove the impact of diseases. This course will present the basic principles of pharmacology, as well as instruction in the diverse mechanisms-of-action, and pharmacological effects (both desired and undesired!) of the major classes of drugs currently used to treat and prevent human diseases. Prerequisites: PSIO 202 co-requisite or PSIO 380 prerequisite AND CHEM 241A.

PCOL 410 –Medicinal Chemistry (4 units)

Mon/Wed/Fri 11:15AM – 12:25 PM **Instructor: Kevin Scott**

Required PharmSci core

PCOL 410 will be a lecture course delivering content in the application of the foundation sciences to drug design. At an appropriate level of content targeting, students will draw on prior math, physics, and chemistry courses in the study of how drugs are conceptualized, designed, and developed. Content will build from basic concepts (structural factors associated with drug activity, drug solubility, pharmacophores) to a consideration of relevant biological drug targets, as well as basic content in structural biology analytical approaches. Prerequisites: CHEM 241B+243B required, BIOC 384 or 385 strongly recommended.

PCOL 429 – Neuropsychopharmacology (3 units)

Thursdays 10:00 – 10:50 AM + online (hybrid course) **Instructor: Ashley Campbell**

PharmSci major elective | **PharmTox Pharmacology emphasis**

The human brain is a complex organ that can be impacted by a spectrum of neurological conditions and diseases at all stages of life. The economic and social burden of neurological disorders is vast, so there is impetus to better understand brain disorders and to find new pharmacological and non-pharmacological treatments. To this end, this course will allow students to explore brain disorders and their current treatments. These include neurodegenerative disorders including Parkinson disease and Alzheimer disease; as well as neuropsychiatric conditions, such as depression, attention deficit hyperactivity disorder (ADHD), sleep-wake disorders, and seizure disorders. Current neuropharmacology will be the overall focus. Prerequisites: PSIO 201 or 380 or NROS 307.

PCOL 436 – Cardiovascular Pharmacology (3 units)

Wednesdays 2:30 – 3:50 PM + online (hybrid course) **Instructor: Qin Chen**

PharmSci major elective | **PharmTox Pharmacology emphasis**

This course provides a comprehensive understanding of cardiovascular pharmacology, focusing on the mechanisms of action, therapeutic uses, adverse effects, and interactions of drugs commonly used in the management of cardiovascular diseases. Students will learn about the underlying pathophysiology of cardiovascular disorders and explore the pharmacological interventions targeting various aspects of cardiovascular function. This includes antihypertensives, cholesterol-lowering drugs, anti-ischemic therapy, and drugs to treat heart failure Additional material will cover dysrhythmias and arrhythmias and anticoagulants and their reversal agents. Renal dynamics as well as the renin-aldosterone-angiotensin system will be reviewed as well as common concepts in hemodynamics, afterload and preload, and the contribution of the CNS to heart function. Students will leave with a greater understanding of cardiovascular physiology supplemented with fundamental pharmacological concepts that allow them significant advantages when exploring healthcare careers. Prerequisites: CHEM 152 or equivalent and MCB 181R.

PCOL 445 – Over-the-Counter Drug Information (3 units)

Wednesdays 9:00 – 9:50 AM + online (hybrid) **Instructor: Bernadette Cornelison**

Honors and Non-Honors Options Available

PharmSci major elective | **PharmTox major elective**

In one semester, learn everything about the most important drug laws that allow us to have safe and efficacious drugs without a prescription. We will cover OTC, BTC, and Rx drugs; dosage forms and bioequivalence; analgesics, gastrointestinal drugs; antiallergy products, drugs for the lips and skin and mucous membranes; cough and cold remedies, hair drugs, smoking cessation compounds, and sleep medications. For each category, students will learn mechanisms of action, uses, and potential side effects. Prerequisites: CHEM 152 and PSIO 202 or 380.

PCOL 465 – Infectious Disease Pharmacology (3 units)

Tues/Thurs 11:00AM – 12:15PM **Instructor: George Watts**

PharmSci major elective | **PharmTox Pharmacology emphasis**

The treatment of infectious disease puts us at the crossroads of many avenues of understanding: history and principles of scientific knowledge, biology, chemistry, physiology, genetics, evolution, epidemiology, and more. Within this framework, we will learn about the drugs and therapies used to treat and prevent infection, how and why they work, and how microbes combat their effectiveness. We will learn how these drugs are absorbed, distributed, metabolized, and excreted by both humans and microbes. Additionally, we will discuss how and why one treatment is chosen over another, side effects, contraindications, and other concerns with the use of these drugs. The overall goal of the course is to provide the student with a broad understanding of the context, mechanisms, and pharmacologic principles in which the drugs used to treat infectious disease operate. Prerequisites: MCB 181R, CHEM 241A.