

Pharmacy Undergraduate Courses – Winter/Spring 2027

All courses are available for registration via UAccess. Contact a College of Pharmacy advisor with questions about these courses, or about how they will apply toward your major or minor. Want to declare a major or minor in Pharmaceutical Sciences or Medical Pharmacology & Toxicology! Reach out to an advisor! Riley Mentel (rmentel@arizona.edu) is the advisor for last names A-M, and Rebecca Field (rmitch@arizona.edu) advises last names N-Z.

Winter Session Courses:

- PCOL 320 – What’s Your Poison? Toxicology of the Substances that Surround Us

Spring Major Courses

- PCOL 300 – Pharmacology of Cosmetics and Self Care Products
- PCOL 305 – Scientific Writing for Health Sciences
- PCOL 310 – Drug Approval: The 3 Billion Dollar Bet
- PCOL 320 – What’s Your Poison? Toxicology of the Substances that Surround Us
- PCOL 350 – ADME: How the Body Changes Drugs
- PCOL 410 – Medicinal Chemistry
- PCOL 418 – Science of Natural Products in Medicine
- PCOL 420 – Environmental Toxicology
- PCOL 427 – Dermatological Pharmacology
- PCOL 434 – Pharmacology of Sex
- PCOL 440 – Science Fact or Science Fiction? How Do You Tell Them Apart?
- PCOL 451 – Introduction to Forensic Toxicology
- PCOL 467 – Pharmacology of Anti-Cancer Drugs
- PCOL 473 – Pharmacogenomics
- PCOL 488 – Drug Hunting for Beginners

Spring General Education Courses

- PCOL 325 – Controversies in Health Care Practice

Spring Elective Courses (Just for fun)

- PCOL 395B – The History of Pharmacy
- PCOL 395C – Professional Pharmacy Pathways
- PCOL 403 – Drug Detailing Essentials: From Science to Sales

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

Fully Online – Honors and Non-Honors Sections Available

Instructor: Jennifer Schnellmann

PharmSci major elective | **PharmTox major elective**

Students will expand their knowledge of pharmaceuticals, 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 product category of product; and expected efficacy of these formulations. At the end of the course, students will be informed consumers who can select beauty and self-care products that deliver meaningful results, avoiding unsafe or limited-efficacy products. Prerequisite: CHEM 152 (or equivalent).

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

Wednesdays 2:00 – 2:50 PM + online (hybrid course)

Instructor: Diana Pacyga

Required PharmSci core | Required PharmTox core

In this three-credit course, students will learn to read and interpret the peer-reviewed scientific literature, analyze data, and write multiple scientific documents. Best practices for data presentation will be emphasized, too. Finally, students will retrieve and analyze medication information and create therapeutic patient profiles. Writing Emphasis Course. Prerequisites: ENGL 102/109H AND CHEM 151 required. Soph, Junior, or Senior class standing required. PharmSci/PharmTox majors and minors receive priority registration.

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

Mon/Wed 11:00 – 11:50 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 a new drug product to market. We will explore how a new drug product is developed from concept to bedside. Prerequisite: ENGL 102 or ENGL 109H. PharmSci majors receive priority registration.

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

Fully Online

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 (or equivalent).

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

Fully Online – Honors and Non-Honors Sections Available

Instructor: Jennifer Schnellmann

PharmSci major elective | PharmTox Toxicology emphasis or major elective

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 and CHEM 151 (or equivalent)

PCOL 325 – Controversies in Healthcare (3 units)

Wednesdays 1:00 – 1:50 PM + online (hybrid course)

Instructor: Jennifer Schnellmann

Honors and Non-Honors Sections Available

Building Connections gen ed – Open to any student

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. This is an approved Building Connections gen ed course, effective in spring 2025. PCOL 325 is an approved PharmSci *minor* course but does not count in the majors.

PCOL 350 – Human ADME and Toxicology (3 units)

Tues/Thurs 2:00 – 3:15 PM

Instructor: George Watts

Required PharmSci core | **Required PharmTox core**

ADME, an acronym for absorption, distribution, metabolism, and excretion, is often the determining factor in whether drugs and chemicals generate the desired effect, no effect, or a harmful effect. PCOL 350 provides students with an overview of how drugs get into the tissues of the body and back out again, what happens along the way, and how things go wrong leading to specific and non-specific toxicities. Students will gain a broad understanding of the mechanisms of toxicity from oxidative damage to genotoxicity, assays and methods for assessing toxicity, and the details of ADME and physiology that lead to damage in specific organs.

Prerequisites: (CHEM 241B) and (PSIO 202 co-requisite or PSIO 380 prerequisite).

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

Online (asynchronous)

Instructor: Beth Zerr

General elective – Open to any student

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. The course will feature artifacts on from the University of Arizona's own History of Pharmacy museum.

PCOL 395C – Professional Pharmacy Pathways (1 unit)

Thursdays 1:00 – 1:50PM – LIVE ONLINE

Instructor: Beth Zerr

General elective – Open to any student

The purpose of this seminar is to expose undergraduate students to different professional paths and opportunities that are available with a Doctorate of Pharmacy (PharmD) degree. Students will have the opportunity to learn from various professionals working in a multitude of different settings as they present on their career experiences. Students will also have the opportunity to interact with these professional during structured question and answer sessions. This will be a synchronous online course, meaning that students must participate online during the designated course time. Grading is based on participation and reflection assignments.

PCOL 403 – Pharmaceutical Detailing Essentials: From Science to Sales

Mondays 1:00 – 1:50 PM + online (hybrid course)

Instructor: Jennifer Schnellmann

General elective – Open to any student

This course teaches the scientific essentials of pharmaceutical science for the layperson. Topics include pharmacology, pharmaceuticals, pharmaceutical research, drug development, and minor biostatistics. Students will learn about drug formulations, regulatory frameworks of clinical trials, and how healthcare is priced and paid for. Course content is designed to better prepare students for rewarding careers in the pharmaceutical industry, including pharmaceutical sales (pharmaceutical detailing). No prerequisites, but some general knowledge of chemistry may be helpful. PCOL 403 is an approved PharmSci *minor* course but does not count in the PharmSci or PharmTox major.

PCOL 410 – Medicinal Chemistry (4 units)

Online (asynchronous)

Instructor: Kevin Scott

Required PharmSci core

PCOL 410 delivers 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 (or equivalent). BIOC 384 or 385 strongly recommended.

PCOL 418 – Science of Natural Products in Medicine (3 units)

Online (asynchronous)

Instructor: Daekyu Sun

PharmSci major elective

Natural Products (NPs) are compounds derived from natural sources, e.g. plants, animals and micro-organisms, which have biological activities. Natural products have been used as healing agents since thousands of years and still today continue to be an excellent and abundant source of therapeutics for many decades. This course will focus on the historical evolution of NP investigation methods, the medical applications of natural products, and drug discovery based on natural products. Detailed information is given for biologically important natural products and drugs of natural origin, including sources, principal components, structural component analysis, drug use, mechanism of action and the role of natural products in modern medicine. Prereqs: CHEM 241B + MCB 181R .

PCOL 420 – Environmental Toxicology (3 units)

Mon/Wed 1:00 – 1:50PM + online (hybrid course)

Instructor: Catharine Smith

PharmSci major elective | **PharmTox Toxicology emphasis or major elective**

In this course, students learn how toxicants produce adverse effects by understanding their environmental fates and biological activities. They learn about monitoring concentrations and the distribution and persistence of agents found in water, soil, air and foods. Toxicity testing procedures and exposure assessments are used to help evaluate the potential for harm to humans and other species. By understanding the cellular targets and biochemical mechanisms of perturbation by toxicants, toxicologists can better estimate adverse effects. Overall, students learn mechanisms by which toxic agents act, their origin and fate and how toxicologists evaluate the risk of adverse effects and balance them against the benefits. Prerequisites: CHEM 152 and MCB 181R

PCOL 427 – Dermatological Pharmacology (3 units)

Fridays 12:00 – 1:45 PM + online (hybrid course)

Instructor: Georg Wondrak

PharmSci major elective | **PharmTox Pharmacology emphasis or major elective**

Skin disorders and diseases frequently cause individuals to seek medical treatment or to attempt often risky at-home approaches that can injure or permanently scar the skin. Thus, there is interest in understanding how human skin functions and interacts with environmental elements and how the use of approved, efficacious pharmacological treatments can be safely used to resolve most skin issues. In this course, students will learn the most medically important skin conditions and how they are identified and treated. Prerequisite: PSIO 201 or 380

PCOL 434– Pharmacology of Sex (3 units)

Mondays 2:00 – 2:50 PM + online (hybrid course)

Instructor: Jennifer Schnellmann

Honors and Non-Honors Sections Available

PharmSci major elective | **PharmTox Pharmacology emphasis or major elective**

This course will offer information about pharmacological agents used to prevent and maintain pregnancy, assist with human birth, increase libido and function, and help with gender transformation or transition. We will explore how drugs affect human sexual function and desire. Finally, we will study chemsex and drugs used in sexual assault.. Prerequisites: CHEM 241A and PSIO 202 or 380.

PCOL 440 – Science Fact or Science Fiction: How Do You Tell Them Apart? (2 units)

Mon/Wed 10:00 – 10:50AM

Instructor: Bernard Futscher

PharmSci major elective

In this class we will explore successes that the rigors of the scientific method have brought to society, as well as how purposeful disruption of the scientific method can obscure scientific truth and lead scientists, science, and humanity astray. The positive results of the scientific method in human health are myriad. For example, the doubling of human lifespan over the past 125 years occurred through advances in pharmaceutical knowledge that better prevents, treats, and cures disease thereby improving the quality and interconnectedness of human life. On the other side of the coin, scientific misinformation, disinformation, and propaganda can disorder the scientific method and disrupt the pursuit of reasoned thought. Examination of both these sides of the human experience will be examined within the context of key examples of scientific advances and retreats. Prerequisites: MCB 181R.

PCOL 451 – Introduction to Forensic Toxicology (3 units)

Tues/Thurs 12:30 – 1:45PM

Instructor: Sarrah Hannon

PharmSci major elective | **PharmTox Toxicology emphasis or major elective**

This course will provide students with an introduction into the world of forensic science and an overview of important topics in forensic toxicology. Students will learn about the types of forensic toxicology, including human performance topics and postmortem toxicology, basic sample preparation and analytical methodologies frequently encountered in forensic toxicology, and an overview of the major types of drugs and toxicants encountered in these types of analyses and investigations. Note: this course contains sensitive topics and information (crimes, drug use, suicides, homicides, etc) and at times may include (deidentified) case reports and photographs. Prerequisites: PSIO 202 or 380 AND CHEM 241A.

PCOL 467 – Pharmacology of Anti-Cancer Drugs (3 units)

Tues/Thurs 11:00AM – 12:15PM

Instructor: George Watts

PharmSci major elective | **PharmTox Pharmacology emphasis or major elective**

The use of chemotherapeutic agents and modern biologics to target and kill cancer cells is a major part of the strategy to treat cancer. The overall goal of the course is to provide the student with a broad understanding of the context, mechanisms, and pharmacologic principles of the use of anticancer drugs. The course provides an understanding of cancer from the systems, cellular, and molecular levels with a focus on the action of modern and historical anticancer drugs. Within this framework we will learn how and why anticancer therapeutics work and how cancers resist them. Additional topics will include the pharmacological details that affect efficacy, choice of treatment, side effects, and contraindications as well as the advances resulting from the genomics revolution that led to molecular targeting and immunotherapy. Prerequisites: MCB 181R and CHEM 241A

PCOL 473 – Pharmacogenomics: Predicting a Patient's Future (3 units)

Tues/Thurs 9:30-10:45AM

Instructor: Bernard Futscher

PharmSci sub-core | **PharmTox major elective**

Within our DNA genome, the code of life, exists decipherable information that can be used to better detect, monitor, predict and guide drug therapy, as well as serve as a foundation for the design and development of new drugs. Since each individual and their genome is unique, responses to drug treatments may be unique as well. By deciphering and therefore understanding the DNA code, it should be ultimately possible to better detect disease and more accurately predict if a drug will have a beneficial, neutral, or toxic effect on an individual. Early proof-of-principle clinical examples provide an optimism that a human genome-based understanding of pharmacotherapy will be a valuable and broadening avenue of basic research and clinical application that improves human health. Prerequisites: PCOL 406 AND 350 prerequisite or co-requisite.

PCOL 488 – Drug Hunting for Beginners (3 units)

Wednesdays 3:00 – 5:30PM

Instructor: Greg Thatcher and Rui Xiong

PharmSci sub-core

This course will integrate and consolidate the basic concepts of chemistry, biochemistry, and pharmacology that underlie drug discovery, design, and development. For selected drug classes, the course will lead students into a deeper understanding of pharmacodynamics beyond pharmacophore and target. Students will learn hands-on computational approaches that emphasize the 3-dimensional nature of drugs and their interaction with proteins to both explore and optimize these interactions. In a team science setting, students will identify a therapeutic target, design small molecules to engage the target and conceptualize the synthesis and testing of these molecules along the drug discovery pipeline, including the consideration of screening approaches, ADMET, and the competitive landscape. The course will use in-class work and a final team presentation of drug discovery projects in the form of a pitch to business and academic experts. Prerequisite: CHEM 241B or equivalent.