Pharmaceutical Sciences Undergraduate Courses – Spring 2023

All courses are available for registration via UAaccess. Contact Rebecca Field at rmitch@arizona.edu with any registration questions. Interested in the Pharmaceutical Sciences major or minor? Email Rebecca for more information!

Spring 2023 course options include the following. Course details and times can be found below.

Core Major Courses:
- PCOL 305 – Scientific Writing for Health Sciences
- PCOL 350 – ADME: How the Body Changes Drugs
- PCOL 410 – Medicinal Chemistry
- PCOL 440 – Rigor & Reproducibility – Bridging Academia and Pharma
- PCOL 473 – Pharmacogenomics
- PCOL 488 – Drug Hunting for Beginners

PharmSci Electives
- PCOL 300 – Pharmacology of Cosmetics and Self Care Products
- PCOL 325 – Controversies in Healthcare
- PCOL 395B – The History of Pharmacy
- PCOL 395C – Professional Pharmacy Pathways
- PCOL 396 – Special Topics in Pharmacy: Exploring Careers in Pharmaceutical Science
- PCOL 418 – Medicinal Chemistry of Natural Products
- PCOL 434 – Pharmacology of Sex
- PCOL 467 – Pharmacology of Anti-Cancer Drugs

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

Instructor: Jennifer Schnellmann
Wednesdays 1:00 – 1:50 PM + online (hybrid course)
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). Approved for use in the PharmSci minor, elective credit for other students.

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

Instructor: Jennifer Schnellmann
Wednesdays 12:00 – 12:50 PM + online (hybrid course)
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 102/109H AND CHEM 151/141/161. PharmSci majors and minors receive priority registration. Required PharmSci major course.

PCOL 325 – Controversies in Healthcare (3 units)

Instructor: Jennifer Schnellmann
Wednesdays 2:00 – 2:50 PM
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. Prerequisites: None. Approved for use in the PharmSci minor, elective credit for other students.
### PCOL 350 – ADME: How the Body Changes Drugs (3 units)

**Tues/Thurs 2:00 – 3:15 PM**  
Instructor: Richard Vaillancourt  
ADME, an acronym for absorption, distribution, metabolism, excretion, is often the determining factor in whether drugs generate the desired effect, or no effect, or a harmful effect. PCOL 350 provides students with a rounded education in the ways that the body changes the chemical form of drugs, as well as the ways that the body directs the movement of drugs over time, from administration through excretion. Prerequisites: (CHEM 241B + 243B) and (PSIO 202 co-requisite or PSIO 380 prereq). Required major course.

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

**Online (asynchronous)**  
Instructor: Richard Vaillancourt  
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.

### PCOL 395C – Professional Pharmacy Pathways (1 unit)

**Tuesdays 11:00 – 11:50AM – LIVE ONLINE**  
Instructor: Beth Zerr  
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. This course will be assessed through class participation and reflection assignments.

### PCOL 396 – Special Topics in Pharmacy: Exploring Careers in Pharmaceutical Science (1 unit)

**Mondays 12:00 – 12:50PM**  
Instructor: Rich Vaillancourt  
This one-unit course is designed to explore the many exciting career options available to students who study pharmaceutical sciences. Students will be exposed to a variety of professional pathways within the pharmaceutical sciences, with different fields highlighted each week. The seminar will also provide guidance about courses to take and opportunities to pursue to become qualified for different career fields, and information about the level of education required for different jobs. Overall, this course is designed to help students identify areas of personal interest that can be further explored during their undergraduate studies and beyond. This course will primarily focus on career pathways outside of clinical healthcare.

### PCOL 410 – Medicinal Chemistry (5 units)

**M/T/W/Th 4:00 - 4:50 PM + F 9:00 or 10:00 discussion**  
Instructor: Eli Chapman  
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+243B required, BIOC 384 or 385 strongly recommended. Required PharmSci major course.

### PCOL 418 – Medicinal Chemistry of Natural Products (3 units)

**Tues/Thurs 12:30 – 1:45PM**  
Instructor: Daekyu Sun  
This course will focus on 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 current status use. Prerequisites: CHEM 241B, MCB 181R, PSIO 202 or 380

### PCOL 434 – Pharmacology of Sex (3 units)

**Mondays 2:00 – 2:50 PM + online (hybrid course)**  
Instructor: Jennifer Schnellmann  
This course will instruct students 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 clinical trials are designed to assess how drugs interact with human sexual function and how we create criteria for safety, efficacy, and risk. Finally, we will cover the underlying mechanisms by which commonly prescribed drugs interfere with human sexual function and desire, and we will explore chemsex, which can have lethal consequences. Prerequisites: CHEM 241A and PSIO 202 or 380
PCOL 440 – Rigor & Reproducibility - Bridging Academic and Pharma (2 units)

Mon/Wed 10:00 – 10:50AM  Instructor: Bernard Futscher

PCOL 440 will introduce students to a timely issue of intense focus, both at the level of funding agencies, as well as at the level of academic-pharma/biotech partnerships in drug commercialization. In both of these environments serious concerns have been raised regarding the level of rigor and reproducibility in academic science. This course will expose students to the spectrum of rigor and reproducibility, and engage students in discussions that aim to link the particular rigor applied to an experiment with the demands that exist for the data; for example, contrasting the demands of a pilot experiment to initially test an idea Vs. the measurement of the response to a new drug that will be used as data to seek investment from a pharmaceutical company. Students will be challenged to develop plans for assays that include clearly described validation schemes. Prerequisite: MCB 181R+L or PSIO 201. PharmSci majors receive priority registration. Required PharmSci major course.

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

Mon/Wed/Fri 11:00 – 11:50AM  Instructor: George Watts

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 Approved for use in the PharmSci minor, elective credit for other students.

PCOL 473 – Pharmacogenomics (3 units)

Tues/Thurs 11:00AM – 12:15PM  Instructor: Bernard Futscher

One of the most exciting areas of the pharmaceutical sciences is "Precision Medicine." Faced with 8-10 different anti-hypertension drugs, intuition and generic recommendations currently guide the choice of which drug to start with. Often this leads to frustrating and dangerous rounds of waiting to see if the drug works safely, and if not, trying the next drug in line. PCOL 473 will introduce the student to the field of pharmacogenomics, which involves measuring the subtle differences in the biological blueprint and its expression in different individuals, and from that drawing conclusions about the likelihood of that individual having a beneficial drug effect, no effect, or a toxic effect. That information is then used to guide the choice and dose of drugs for the patient. Prerequisites: PCOL 350 and PCOL 406. Required PharmSci major course.

PCOL 488 – Drug Hunting for Beginners (3 units)

Wednesdays 3:00 – 5:30PM  Instructor: Greg Thatcher

This course will integrate and consolidate the basic concepts of chemistry 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 predict these interactions. In a team science setting, students will design small molecules to engage a protein target and conceptualize the synthesis and testing of these molecules along the drug discovery pipeline, including the consideration of screening approaches and ADMET hurdles. The course will use in-class work and team-based assignments, concluding in team presentations of drug discovery project pitches. Prerequisite: PCOL 410. Required major course. Replaces previous PHCL 460 in the major curriculum.