Pharmaceutical Sciences Undergraduate Courses – Fall 2022

All courses are available for registration via UAccess. Contact Rebecca Field at rfield@pharmacy.arizona.edu with any registration questions. Interested in the Bachelor of Science in Pharmaceutical Sciences major or minor? Email Rebecca for more information!

Fall 2022 course options include the following. Course details and times can be found below.

- **PCOL 196D - The Joy of Drugs: An Introduction to Pharmaceutical Sciences**
  - Instructor: Jennifer Schnellmann
  - Wednesdays 3:00 – 3:50 PM
  - 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. Pass/fail course.
  - Open to all majors.

- **PCOL 200 – Drugs & Humanity**
  - Instructor: Bernie Futscher
  - Tues/Thurs 9:30 – 10:45AM
  - 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.

- **PCOL 305 – Scientific Writing for Health Sciences (3 units)**
  - Instructor: Jennifer Schnellmann
  - Wednesdays 1:00 – 1:50 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 or ENGL 109H. PharmSci majors and minors receive priority registration. Required PharmSci major course.

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

**Instructor:** Elizabeth Hall-Lipsy

*Mon/Wed 10:00 – 10:50 AM*

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 or ENGL 109H. PharmSci majors receive priority registration. Required PharmSci major course.

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

**Instructor:** Jennifer Schnellmann

*Wednesdays 12:00 – 12:50 PM + online (hybrid course)*

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 151/141+143/161+163)

PCOL 325 – Controversies in Health Care Practice (3 units)

**Instructor:** Jennifer Schnellmann

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

This course will allow students to explore the most controversial and timely topics in health care 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)

**Instructors:** Jianqin Lu, Bo Sun, Abhigit Date

*Tues/Thurs 2:00 – 3:15 PM*

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 principals. Prerequisites: CHEM 241B and 243B.

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

**Instructor:** James Galligan

*Tues/Thurs 12:30 – 1:45 PM*

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: PCOL 406, PSIO 202 or 380, and CHEM 241. Available only to PharmSci majors with Advanced Standing and minors.

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

**Instructors:** Richard Vaillancourt & Stephen Hall

*Tuesdays 3:00 – 3:50 PM*

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. Open to students in all majors.
PCOL 396 (002) – Special Topics in Pharmacy: Infectious Disease Pharmacology (3 units)

Tues/Thurs 11:00AM – 12:15PM  Instructor: George Watts
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. *Students who are interested in registering must email Rebecca Field at rfield@pharmacy.arizona.edu to obtain departmental consent. All students who have the required prerequisites will receive registration permission.

PCOL 405 – Current Techniques in Pharmaceutical Science

Monday/Thursday 4:00 – 5:15 PM  Instructors: Daekyu Sun, Georg
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: Richard Vaillancourt
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. Required PharmSci major course

PCOL 410 – Medicinal Chemistry (5 units)

Mon/Wed/Fri 11:15AM – 12:40PM  Instructors: Wei Wang, Hongmin Li, Rui Xhiong
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. Open to PharmSci majors with advanced standing and PharmSci minors. Required PharmSci major course.