Fall 2020 Course Descriptions as of 04/05/2020 08:13 PM

Information in Browse Course Catalog is subject to change. Information is term specific. Please refer to the appropriate term when searching for course content. Key to Course Descriptions may be found at: **http://rcs.registrar.arizona.edu/course_descriptions_key**.

Pharmacology & Toxicology (PCOL)

PCOL 105A: Steps2STEM Research Apprenticeship (3 units)
Description: Steps2STEM High School Research Apprenticeship is a three-unit course for high school students with an interest in biotechnology, toxicology, genetics, bioengineering, medicine, pharmacy and environmental health. Through apprenticeship activities, students attend hands-on training, assist in performing research in an active laboratory, and learn science communication through weekly workshops. The summer culminates with a presentation where they showcase their experience to the academic community and their friends and family.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Lecture Required
Course typically offered: Community Campus: Summer
Recommendations and additional information: Available only to high school students who have been admitted to the Steps2STEM program.
Field trip: None

PCOL 105B: Our Land, Our Education, and Our Health (3 units)
Description: This course is a capstone activity for students of the One Stop Program, who also work in tribal departments as a component of the course. There are seminars to prepare the students for their University of Arizona experience. It is organized to expose students to the environmental issues of their communities and how each department has a role to play in environmental health. The study of environmental health is a diverse interdisciplinary field that includes science, technology, engineering, and mathematics (STEM), soil science, anthropology, and human ecology. Across these disciplines is the emerging dominant paradigm of environmental science. At its core, environmental health perspectives and theories of human environmentalism consider the complexity of individual, group, and land relationships as they unfold across multiple generations.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Lecture Required
Course typically offered: Community Campus: Summer
Recommendations and additional information: Department consent required to enroll. This course is only open to "One Start" participants who have been accepted to the competitive OLEH program.
Field trip: None

PCOL 189: Molecules That Changed History (2 units)
Description: The course is intended for both science and non-science majors advancing science literacy. The course will introduce molecules and the related chemistry and biology that impacted history. Subject area ranges from the `Spice Wars' to `Gun Powder' to how wonder drugs solved lethal diseases. Each class period will encompass simple chemistry, basic biology, and the context of the history at the time of discover and initial use of chemical. Then, discussion will include the context of the chemical in modern time. Using the book `Napoleon's Buttons: 17 Molecules that Changed History' as a text, this course will take a detailed look at each of the molecules in the book from both an historical as well as scientific point of view. There is a requirement to read one chapter each week for class preparation. Class sessions will consist of a discussion on the historical context of the given molecule or class of molecules, a detailed discussion of the biology, chemistry, physiology, and toxicology/pharmacology of each of the molecules and an up-to-date discussion about the molecules and classes of molecules. This latter part will include the state-of-the-art in a given chemical class as well as contemporary concerns and solutions. The students will be required to attend lectures and there will be one midterm exam, however, the majority of the students' grade will come from a written/presentation project on a molecule not covered in class that they feel has had significant historical impact. This engagement piece encourages students to be motivated in the learning process as well as interactive with the instructors and classmates.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Lecture Required
Course typically offered:
Main Campus: Spring

-SA represents a Student Abroad & Student Exchange offering
-CC represents a Correspondence Course offering
May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

PCOL 195A: Pharmaceutical Science: From Bench to Bedside (1 unit)
Description: The course will track the development phases of a medicine of the future from its discovery, design to preclinical development to clinical development to its adoption, clinical application, use and evaluation. How medicines are discovered and produced require an awareness and knowledge of the many factors that interplay and influence pharmacologic actions, physiologic responses, effectiveness and toxicity. Many different and specific research approaches and methods link the processes of development to the use and evaluation of a promising therapeutic entity. This course will attempt to explain how scientists are guided by many disciplines such as: medicinal chemistry, pharmacology, immunology; genetics and pharmacogenomics, pharmacokinetics, clinical toxicology and therapeutics, pharmacoepidemiology, and pharmacoeconomics/health outcomes in the search for and discovery of new drugs. The course will also give attention to providing insight into health and disease and their influence on developing new medicines. How medicines work, when they don¿t work or even become harmful will be addressed.
Grading basis: Student Option ABCDE/PF
Career: Undergraduate
Course Components: Colloquium Required
Course typically offered:
Main Campus: Spring

Freshman Colloquia: Freshman Colloquia

PCOL 196D: The Joy of Drugs: Introduction to Pharmaceutical Sciences Seminar (1 unit)
Description: 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.
Grading basis: Alternative Grading: S, P, F
Career: Undergraduate
Course Components: Seminar Required
Course typically offered:
Main Campus: Fall, Spring, Summer

PCOL 205: Student's Journey Apprenticeship (3 units)
Description: A Student's Journey is a three-unit course for Tohono O'odham Community College (TOCC) students with an interest in pursuing a 4-year degree at higher education institutions for their future academic and professional careers. The course offers a unique summer opportunity to motivated TOCC students who possess a strong interest in social justice, environmental health, higher education, and developing professional workforce skills.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Lecture Required
Course typically offered: Community Campus: Summer
Recommendations and additional information: Departmental consent required for enrollment. This course is available only to Tohono O'odham Community College students who have been admitted to the "Student's Journey" program.
Field trip: None

PCOL 299: Independent Study (1 - 4 units)
Description: Qualified students working on an individual basis with professors who have agreed to supervise such work.
Grading basis: Alternative Grading: S, P, F
Career: Undergraduate
Course Components: Independent Study Required
Repeatable: Course can be repeated a maximum of 99 times.
Course typically offered:
Main Campus: Fall, Spring, Summer

PCOL 299H: Honors Independent Study (1 - 3 units)
Description: Qualified students working on an individual basis with professors who have agreed to supervise such work.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Independent Study Required
Repeatable: Course can be repeated a maximum of 99 times.
Course typically offered:
Main Campus: Fall, Spring, Summer

Enrollment requirement: Student must be active in the Honors College.
Honors Course: Honors Course
Honors Course: Honors Course

-SA represents a Student Abroad & Student Exchange offering
-CC represents a Correspondence Course offering
May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

PCOL 300: Pharmacology of Cosmetics and Self-care Products (3 units)
Description: 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 to 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.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Lecture Required
Course typically offered:
Main Campus: Fall

Enrollment requirement: CHEM 152, CHEM 142, or CHEM 162.
Honors Course: Honors Contract
Honors Course: Honors Contract

PCOL 305: Scientific Writing for Health Science Students (3 units)
Description: In this three-credit course required for the BSPS program, 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.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Discussion May Be Offered
Lecture Required
Course typically offered:
Main Campus: Fall, Spring

Enrollment requirement: Prerequisite: ENGL 102 OR 108 OR 109H
Writing Emphasis: Writing Emphasis Course

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-CC represents a Correspondence Course offering
May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

PCOL 310: Drug Approval: The 3 Billion Dollar Bet (2 units)
Description: Almost 60 billion dollars (2016) are spent annually on pharmaceutical research and development in the United States and almost 425 billion dollars (2015) 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.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Lecture Required
Course typically offered:
Main Campus: Spring

Enrollment requirement: Prerequisite: ENGL 102 OR 108 OR 109H

PCOL 350: ADME: How the Body Changes Drugs (3 units)
Description: 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.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Lecture Required
Course typically offered:
Main Campus: Spring

Recommendations and additional information: PCOL 360 is recommended.
Enrollment requirement: PSIO 380 prerequisite OR PSIO 202 co-requisite AND CHEM 241B+243B or CHEM 246B+ 247B.

PCOL 355: Drug Delivery Systems (3 units)
Description: 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.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Lecture Required
Course typically offered:
Main Campus: Fall

Enrollment requirement: CHEM 241A + 243A

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May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

PCOL 390: Biomarkers: Analysis of Drug Effect and Toxicity (3 units)
Description: 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.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Lecture Required
Course typically offered:
Main Campus: Spring

Enrollment requirement: Prerequisites include PCOL 406 AND (PSIO 202 OR PSIO 380) AND (CHEM 241A OR CHEM 242A)

PCOL 391: Preceptorship (1 - 3 units)
Description: Specialized work on an individual basis, consisting of instruction and practice in actual service in a department, program, or discipline. Teaching formats may include seminars, in-depth studies, laboratory work and patient study.
Grading basis: Alternative Grading: S, P, F
Career: Undergraduate
Course Components: Independent Study Required
Repeatable: Course can be repeated a maximum of 4 times.
Course typically offered:
Main Campus: Fall, Winter, Spring, Summer

PCOL 392: Directed Research (1 - 6 units)
Description: Individual or small group research under the guidance of faculty.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Independent Study Required
Repeatable: Course can be repeated a maximum of 12 times.
Course typically offered:
Main Campus: Fall, Spring, Summer 1 and 2

PCOL 393: Internship (1 - 6 units)
Description: Specialized work on an individual basis, consisting of training and practice in actual service in a technical, business, or governmental establishment.
Grading basis: Alternative Grading: S, P, F
Career: Undergraduate
Course Components: Independent Study Required
Repeatable: Course can be repeated a maximum of 6 times.
Course typically offered:
Main Campus: Fall, Spring, Summer 1 and 2

Student Engagement Activity: Professional Development
Student Engagement Competency: Professionalism

PCOL 395: The Chemical Environment, Environmental Exposures, and Human Disease (1 unit)
Description: PCOL 395 is an active-learning course that is designed to introduce the field of environmental health science, a scientific field focused on the relationship between chemical exposures in the environment, altered biological processes, and human disease risk. This exciting area of human biomedical research will be taught through the use of real-world examples of environmental contamination, human exposure, and the resulting consequences. The course will take holistic view, integrating basic principles of toxicology and epidemiology, as well as the social impact of environmental contamination.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Colloquium Required
Repeatable: Course can be repeated a maximum of 4 times.
Course typically offered:
Main Campus: Fall

PCOL 396: Special Topics in Pharmacy (1 - 3 units)
Description: This special topics seminar will allow students to learn about relevant and current topics in pharmacology, pharmaceutical sciences, and pharmacy practice. Topics vary by semester and by section.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Seminar Required
Repeatable: Course can be repeated a maximum of 8 times.
Course typically offered:
Main Campus: Fall, Spring

Field trip: none

PCOL 399: Independent Study (1 - 5 units)
Description: Qualified students working on an individual basis with professors who have agreed to supervise such work.
Grading basis: Alternative Grading: S, P, F
Career: Undergraduate
Course Components: Independent Study Required
Repeatable: Course can be repeated a maximum of 99 times.
Course typically offered:
Main Campus: Fall, Spring

PCOL 399H: Honors Independent Study (1 - 3 units)
Description: Qualified students working on an individual basis with professors who have agreed to supervise such work.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Independent Study Required
Repeatable: Course can be repeated a maximum of 99 times.
Course typically offered:
Main Campus: Fall, Spring

Enrollment requirement: Student must be active in the Honors College.
Honors Course: Honors Course
Honors Course: Honors Course

PCOL 406: Comprehensive Human Pharmacology (5 units)
Description: 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.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Lecture Required
Course typically offered:
Main Campus: Fall

Enrollment requirement: Students may enroll in PCOL 406 with a pre-requisite of PSIO 380 OR a co-requisite of PSIO 202.

PCOL 410: Medicinal Chemistry (5 units)
Description: 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.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Discussion Required
Lecture Required
Course typically offered:
Main Campus: Spring

Enrollment requirement: CHEM 241B and 243B are required

PCOL 423: Mechanisms of Disease (3 units)
Description: This course focuses on the fundamental pathogenetic mechanisms and lesions which are common to all mammalian species and which are manifested as disease. The course is centered upon General Pathology and focuses on how different types of disease develop and their consequences. The material is presented using a comparative (i.e. animal and human) approach that emphasizes the commonalities between disease processes rather than the exceptions. Successful integration of course concepts will provide the necessary foundation on which competency in clinical, diagnostic, or experimental medicine and biomedical research can be built. Further, the course will provide the general mechanistic knowledge required for the subsequent study and understanding of specific disease entities, categorized by organ system, in Systemic Pathology. The course stresses general mechanisms of disease common to all mammalian species and is divided into 5 major sections: tissue injury and adaptation; inflammation and repair; disorders of circulation; disorders of immunity; and disorders of cell growth with emphasis on neoplasia. Available for honors credit.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Lecture Required
Also offered as: ACBS 423, MIC 423
Co-convened with: PCOL 523
Course typically offered:
Main Campus: Spring

Recommendations and additional information: Six units of upper division ACBS and/or MIC credit, or consent of instructor.
Home department: School of Animal & Comparative Biomedical Sciences
Enrollment requirement: Prerequisites: ACBS 400A (or 500A) and ACBS 400B (or 500B) or concurrent enrollment, or PSIO 201 and PSIO 202 or concurrent enrollment, or ACBS 215 or concurrent enrollment, or consent of instructor.

PCOL 440: Rigor and Reproducibility: Bridging Academia and Pharma (2 units)
Description: 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. Guest presenters will be used for some class sessions, including representatives from the UA office for Responsible Conduct in Research.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Lecture Required
Course typically offered:
Main Campus: Fall

Enrollment requirement: Enrollment requires completion of MCB 181R+181L OR ECOL 182R+182L OR PSIO 201.

PCOL 473: Pharmacogenomics: Predicting a Patient's Future (3 units)
Description: 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.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Lecture Required
Course typically offered:
Main Campus: Spring

Enrollment requirement: PCOL350, PCOL360

PCOL 484: Fundamentals of Industrial and Environmental Health (3 units)
Description: Introduction to the principles of occupational and environmental health, with emphasis on industrial hygiene aspects of recognition, evaluation, and control of environmental and industrial health hazards.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Lecture Required
Equivalent to: CE 484, MNE 484, OSH 484, PCOL 484, PHL 484
Also offered as: EHS 484, MNE 484, NSC 484
Co-convened with: PCOL 584
Course typically offered:
Main Campus: Fall

Home department: Community, Environment & Pol

PCOL 492: Directed Research (1 - 6 units)
Description: Individual or small group research under the guidance of faculty.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Independent Study Required
Repeatable: Course can be repeated a maximum of 12 times.
Course typically offered:
Main Campus: Fall, Winter, Spring, Summer

PCOL 498: Senior Capstone (1 - 3 units)
Description: A culminating experience for majors involving a substantive project that demonstrates a synthesis of learning accumulated in the major, including broadly comprehensive knowledge of the discipline and its methodologies. Senior standing required.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Independent Study Required
Course typically offered:
Main Campus: Fall, Spring

PCOL 498H: Honors Thesis (3 units)
Description: An honors thesis is required of all the students graduating with honors. Students ordinarily sign up for this course as a two-semester sequence. The first semester the student performs research under the supervision of a faculty member; the second semester the student writes an honors thesis.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Independent Study Required
Repeatable: Course can be repeated for a maximum of 9 units.
Course typically offered:
Main Campus: Fall, Spring

Enrollment requirement: Student must be active in the Honors College.
Honors Course: Honors Course
Honors Course: Honors Course
Writing Emphasis: Writing Emphasis Course

PCOL 499: Independent Study (1 - 6 units)
Description: Qualified students working on an individual basis with professors who have agreed to supervise such work.
Grading basis: Alternative Grading: S, P, F
Career: Undergraduate
Course Components: Independent Study Required
Repeatable: Course can be repeated a maximum of 99 times.
Course typically offered:
Main Campus: Fall, Spring, Summer

PCOL 499H: Honors Independent Study (1 - 6 units)
Description: Qualified students working on an individual basis with professors who have agreed to supervise such work.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Independent Study Required
Repeatable: Course can be repeated a maximum of 99 times.
Course typically offered:
Main Campus: Fall, Spring

Enrollment requirement: Student must be active in the Honors College.
Honors Course: Honors Course
Honors Course: Honors Course

PCOL 501: Introduction to Pharmacology, Drug Discovery & Pharmaceutics (4 units)
Description: PCOL/PHSC 501 is a required core course designed for students in the College of Pharmacy who are pursuing a graduate degree in one of three program tracts, which includes Pharmacology & Toxicology, Drug Discovery & Development, and Pharmaceutics & Pharmacokinetics. The course will present basic principles that underlie each of these program tracts and will provide a basis for more advanced work in these areas of study.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Also offered as: PHSC 501
Course typically offered:
Main Campus: Fall

Recommendations and additional information: Undergraduate experience expected in chemistry, calculus, biology and biochemistry. Additional coursework in anatomy, physiology, molecular biology and advanced chemistry is helpful but not required.
Field trip: No field trips

PCOL 502: Environmental Monitoring Methods (3 units)
Description: Introduction to sampling techniques and analytical methods to measure environmental contamination in the air, water, soils and food. Emphasis on instrument selection and quality control, including documentation, calibration, and sample management.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Equivalent to: PCOL 502
Also offered as: EHS 502
Course typically offered:
Main Campus: Fall

Home department: Community, Environment & Pol

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-CC represents a Correspondence Course offering
May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

PCOL 505: Current Techniques in Pharmaceutical Sciences (3 units)
Description: This three-credit, team-taught course is offered by the faculty of the Department of Pharmacology and Toxicology of the College of Pharmacy and other invited speakers. This course will cover essential laboratory techniques that are used in the fields of medicinal chemistry, pharmacology, and pharmaceutics.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Also offered as: PHSC 505
Course typically offered:
Main Campus: Fall

Recommendations and additional information: Recommended for students in Medicinal Chemistry, Pharmacology & Toxicology, Pharmaceutics, Cancer Biology, & other Interdisciplinary Programs. Available for qualified undergraduate students.
Field trip: None

PCOL 509C: Statistics for Research (3 units)
Description: Statistical concepts and methods applied to research in other scientific disciplines. Principles of estimation and hypothesis testing for standard one-and two-sample procedures. Correlation, linear regression. Contingency tables and analysis of variance.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Equivalent to: GENE 509C, PCOL 509C
Also offered as: GENE 509C, MATH 509C
Course typically offered:
Main Campus: Spring (even years only)

Recommendations and additional information: MATH 112.
Home department: Mathematics

PCOL 510: Physical Exposures (3 units)
Description: Participants will understand the health effects, evaluate exposures, and identify control options available to reduce exposures to physical stressors in the environment. The course focuses on noise, heat stress, vibration, radiation and ergonomics.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Equivalent to: PCOL 510
Also offered as: EHS 510
Course typically offered:
Main Campus: Spring (odd years only)

Home department: Community, Environment & Pol

PCOL 511: Pharmaceutical Solids, Nanotechnology & Solid-State Particle Engineering Design in Drug Delivery (3 units)
Description: The purpose of this graduate course is to provide the Pharmaceutical Science graduate student with a basis of understanding of a wide variety of important topics and advances in pharmaceutical solids i.e. solid-state pharmaceutics. Topics include fundamental principles, powder technology, nanotechnology in pharmaceutical solids, solid-state particle engineering design in drug delivery, solid state phase transitions, water vapor-solid surface interactions, interparticulate interactions in pharmaceutical powders, and dry powder inhalers. Critical thinking and problem solving will be applied to the above principles.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Also offered as: PHSC 511
Course typically offered:
Main Campus: Spring

Recommendations and additional information: Undergraduate Senior with consent of the Instructor.
Home department: Pharmaceutical Sciences

PCOL 515: Mechanisms of Human Diseases (4 units)
Description: Biochemical, structural, and functional changes in cells, tissues, and organs, which cause and are caused by diseases. For graduate students training for a career in biomedical research.
Grading basis: Regular Grades
Career: Graduate
Course Components: Laboratory Required
Lecture Required
Also offered as: CBIO 515, PATH 515
Course typically offered:
Main Campus: Spring

Recommendations and additional information: Open to all graduate students.
Home department: Pathology

PCOL 520B: Cellular Communications and Signal Transduction (3 units)
Description: Principles of molecular signaling regulating membrane, cytoplasmic, and nuclear events in eukaryotic cells. Topics include extracellular signals, intracellular transduction pathways, modulation of cell signaling, and biological processes controlled by specific signaling pathways.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Equivalent to: CBIO 630B
Also offered as: CBIO 520B
Course typically offered:
Main Campus: Fall

Recommendations and additional information: Undergraduate juniors in the Honors college and undergraduate seniors with a minimum 3.0 GPA can register for the course with instructor and Graduate College approval.

PCOL 522: Contrast Agents, Molecular Imaging, and Kinetics (3 units)
Description: Current topics in drug discovery and molecular imaging involve the integration of a series of research modalities. The pharmaceutical Industry uses these modalities in their developmental and regulatory efforts to attain new indications. As well, the medical device community is continually developing new techniques to enhance medical imaging for the earliest detection of disease. Furthermore, kinetic ADME studies (absorbtion, distribution, metabolism, and excretion) are required so as to determine the fate of these agents as an indicator of efficacy and toxicity.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Equivalent to: CBIO 524, PHCL 524
Also offered as: BME 522, CBIO 522, OPTI 522, PHCL 522
Course typically offered:
Main Campus: Spring

Home department: Biomedical Engineering

PCOL 523: Mechanisms of Disease (4 units)
Description: Comparative general pathology of animal and selected human diseases with emphasis on pathogenesis, pathophysiology, and morphologic and biochemical changes at the macroscopic, microscopic and molecular levels. Recitation will stress general mechanisms of disease common to all mammalian species, with focus on tissue injury and adaptation; inflammation and repair; and disorders of circulation, immunity, and cell growth, including neoplasia. Available for honors credit. Graduate-level requirements will include outside discussion and preparation of a research proposal on a relevant topic emphasizing the molecular pathogenesis of selected infectious diseases and currently applicable biotechniques, and critical analysis of related publications from the current literature.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Also offered as: ACBS 523, IMB 523
Co-convened with: ACBS 423
Course typically offered:
Main Campus: Spring

Home department: School of Animal & Comparative Biomedical Sciences
Enrollment requirement: Prerequisites: ACBS 500A and ACBS 500B or concurrent enrollment, or PSIO 201 and PSIO 202 or concurrent enrollment, or ACBS 215 or concurrent enrollment, or consent of instructor.

PCOL 530: Introduction to Molecular Therapeutics and Drug Discovery (2 units)
Description: This will be a two-unit team taught introductory course offered by the faculty of the Drug Discovery and Development (DDD) and Pharmacology/Toxicology (PharmTox) graduate tracks of the College of Pharmacy. The course is intended to familiarize first year graduate or senior undergraduate students with (i) critical concepts of drug discovery, (ii) inclusion of basic pharmacological principles, and (iii) exemplary molecular therapeutics of historic and contemporary importance.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Also offered as: CBIO 530, CHEM 530, PHSC 530
Course typically offered:
Main Campus: Fall

Home department: Pharmaceutical Sciences

PCOL 535: General and Systems Toxicology (3 units)
Description: Survey of tissue and organ system effects of environmental chemicals. Introduction to adsorption, distribution, metabolism, and elimination of chemicals; toxicology of liver, lung, kidney, central nervous system, skin, reproductive systems, hematopoeitic system, and immune system. Introduction to carcinogenesis and developmental toxicology.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Also offered as: CBIO 535, EHS 535
Course typically offered:
Main Campus: Fall

Recommendations and additional information: Organic chemistry, two semesters of biology and one semester of biochemistry. Undergraduate seniors with consent of instructor.

PCOL 536A: Chemotherapy of Infectious Diseases (3 units)
Description: Comprehensive survey of anti-infective drugs.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Co-convened with: PCOL 836A
Course typically offered:
Main Campus: Spring

PCOL 537A: Medicinal Chemistry II (3 units)
Description: Continuation of the comprehensive survey of the medicinal chemistry of drugs, including agents acting on the autonomic, cardiovascular, hematopoietic, inflammatory, and gastrointestinal systems, vitamins and radiopharmaceuticals.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Equivalent to: PCOL 537A
Also offered as: PHSC 537A
Course typically offered:
Main Campus: Fall

Recommendations and additional information: PCOL 536A.
Home department: Pharmaceutical Sciences

PCOL 537B: Medicinal Chemistry III (2 units)
Description: Continuation of the comprehensive survey of the medicinal chemistry of drugs, including agents acting on the endocrine and central nervous systems.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Equivalent to: PCOL 537B
Also offered as: PHSC 537B
Course typically offered:
Main Campus: Spring

Recommendations and additional information: PCOL 536A and PHSC 537A.
Home department: Pharmaceutical Sciences

PCOL 539: Methods in Cell Biology and Genomics (3 units)
Description: In-depth, practical and theoretical analysis of novel, experimental methods that advance our understanding of modern biology.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Also offered as: GENE 539, MCB 539, PLS 539, PSIO 539
Course typically offered:
Main Campus: Fall (even years only)

Home department: School of Plant Science

PCOL 550: Drug Disposition and Metabolism (2 units)
Description: Principles of absorption, distribution and excretion of drugs, with emphasis on mechanisms of drug metabolism.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Equivalent to: CBIO 550, PHCL 550, TOX 550
Also offered as: CBIO 550
Course typically offered:
Main Campus: Spring

Recommendations and additional information: PCOL 602A.

PCOL 553: Toxicology and Chemical Exposure (3 units)
Description: Principles of toxicology related to industry and the environment; dose response; mechanisms of toxicity; hazard evaluation principles; toxicology of major classes of industrial and environmental compounds
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Equivalent to: PCOL 553
Also offered as: EHS 553
Course typically offered:
Main Campus: Spring (even years only)

Home department: Community, Environment & Pol

PCOL 571A: Pharmacology I (4 units)
Description: Continuation of the comprehensive survey of the pharmacology of drugs, including agents acting on the autonomic, cardiovascular, hematopoietic, and inflammatory systems.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Equivalent to: TOX 571A
Co-convened with: PCOL 871A
Course typically offered:
Main Campus: Fall

PCOL 571C: Pharmacology II (3 units)
Description: This course is the second of a two semester course covering the basic science of pharmacology. Generally, Pharmacology is concerned with all aspects of the action of drugs on living systems. In its entirety, pharmacology embraces biochemical and physiological effects, mechanisms of action, pharmacokinetics, and therapeutic and diagnostic uses of drugs.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Co-convened with: PCOL 871C
Course typically offered:
Main Campus: Spring

PCOL 573: Environmental Toxicology (1 unit)
Description: Environmental Toxicology defines an emerging area filled with new discoveries concerning the effect of environment or environmental chemicals on biological systems. This course is designed to bring students the up-to-date information within this rapid developing area of science. The lecture will be based on the background, overview or new discovery type of information for each discipline listed. The lecture will be 35-40 minutes followed by 20 minutes of discussion or question-answering period of time. The main focus will be for students to understand new movements and new trends of selected topics within the expertise of the Southwest Environmental Health Sciences Center and environmental toxicology research programs at the University of Arizona.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Repeatable: Course can be repeated a maximum of 2 times.
Course typically offered:
Main Campus: Spring

PCOL 574: Clinical Toxicology (2 units)
Description: Individual study or special project or formal report thereof submitted in lieu of thesis for certain master's degrees.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Equivalent to: TOX 574
Co-convened with: PCOL 874
Course typically offered:
Main Campus: Spring

PCOL 584: Fundamentals of Industrial and Environmental Health (3 units)
Description: Introduction to the principles of occupational and environmental health, with emphasis on industrial hygiene aspects of recognition, evaluation, and control of environmental and industrial health hazards. Graduate-level requirements include a comprehensive paper detailing hazards associated with a particular health hazard.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Equivalent to: CE 584, OSH 584, PCOL 584
Also offered as: EHS 584, NSC 584
Co-convened with: NSC 484
Course typically offered:
Main Campus: Fall

Home department: Community, Environment & Pol

-SA represents a Student Abroad & Student Exchange offering
-CC represents a Correspondence Course offering
May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

PCOL 586A: Introduction to Pharmacology and Toxicology Research (2 units)
Description: Introduction to basic research techniques in pharmacology and toxicology through supervised laboratory rotations; student-initiated and faculty-structured lab. Exercises in modern pharmacological and toxicological techniques.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Repeatable: Course can be repeated a maximum of 3 times.
Equivalent to: PHCL 586A
Course typically offered:
Main Campus: Fall, Spring

PCOL 586B: Introduction to Pharmacology and Toxicology Research (2 units)
Description: Introduction to basic research techniques in pharmacology and toxicology through supervised laboratory rotations; student-initiated and faculty-structured lab. Exercises in modern pharmacological and toxicological techniques.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Equivalent to: PHCL 586B
Course typically offered:
Main Campus: Spring

PCOL 593: Internship (1 - 3 units)
Description: Specialized work on an individual basis, consisting of training and practice in actual service in a technical, business, or governmental establishment.
Grading basis: Alternative Grading: S, P, F
Career: Graduate
Course Components: Independent Study Required
Course typically offered:
Main Campus: Fall, Spring

PCOL 595G: Cancer Biology: Focus on Breast Cancer (1 unit)
Description: This a graduate-level journal club which will focus on the biology of cancer with a specific focus on breast cancer-related peer-reviewed research articles.
Grading basis: Regular Grades
Career: Graduate
Course Components: Colloquium Required
Repeatable: Course can be repeated a maximum of 7 times.
Equivalent to: BIOC 595G, CBA 595G, CBIO 595G, PCOL 595G
Also offered as: CBIO 595G, CMM 595G, MCB 595G
Home department: Molecular & Cellular Biology
Interdisciplinary Interest Area: BIOC - Biochemistry

-SA represents a Student Abroad & Student Exchange offering
-CC represents a Correspondence Course offering
May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

PCOL 595H: Problems in the Biology of Complex Diseases (2 units)
Description: Complex diseases (CDs: e.g., asthma, allergy, COPD, obesity, inflammatory bowel disease, hypertension, coronary artery disease, diabetes, rheumatoid arthritis, multiple sclerosis, schizophrenia) are the next major challenge in human biology because they are at the same time unique, common and difficult to decipher. The complexity of CDs lies in their pathogenesis, in which a constellation of environmental and genetic factors interact in intricate ways to alter biological thresholds and response patterns, modifying disease susceptibility. Since both genes and environmental exposures contribute to CDs, the biological pathways involved in CD pathogenesis depend on the genetic background of a given population and the specific environment to which that population is exposed. Hence, asthma, obesity and hypertension in Arizona may not be the same as asthma, obesity and hypertension in Iceland.
Grading basis: Regular Grades
Career: Graduate
Course Components: Colloquium Required
Equivalent to: GENE 595H, IMB 595H, MCB 595H
Also offered as: CMM 595H, GENE 595H, IMB 595H, MCB 595H
Course typically offered:
Main Campus: Spring

Home department: Cellular & Molecular Medicine

PCOL 596A: Medicinal and Natural Products Chemistry (1 unit)
Description: The development and exchange of scholarly information, usually in a small group setting. The scope of work shall consist of research by course registrants, with the exchange of the results of such research through discussion, reports, and/or papers.
Grading basis: Regular Grades
Career: Graduate
Course Components: Seminar Required
Repeatable: Course can be repeated a maximum of 99 times.
Also offered as: PHSC 596A
Course typically offered:
Main Campus: Fall, Spring

Home department: Pharmaceutical Sciences

PCOL 596L: National Health Care Systems (1 unit)
Description: This seminar course will compare US healthcare delivery systems with the national health care systems of 12 other industrialized nations. Each of these 12 nations has a health care system that covers all or nearly all of its citizens. Each nation is a member of OECD which has collected comparative health care data on each country since 1960.
Grading basis: Alternative Grading: S, P, F
Career: Graduate
Course Components: Seminar Required
Equivalent to: MEDI 596L, NURS 596L, PCOL 596L, PHSC 596L
Also offered as: MEDI 596L, NURS 596L, PHPM 596L, PHSC 596L
Home department: Community, Environment & Pol

PCOL 599: Independent Study (2 - 4 units)
Description: Qualified students working on an individual basis with professors who have agreed to supervise such work. Graduate students doing independent work which cannot be classified as actual research will register for credit under course number 599, 699, or 799.
Grading basis: Alternative Grading: S, P, F
Career: Graduate
Course Components: Independent Study Required
Repeatable: Course can be repeated a maximum of 99 times.
Course typically offered:
Main Campus: Fall, Spring, Summer

PCOL 601A: Epigenetics in Development and Disease (2 units)
Description: Epigenetics is the study of heritable changes in gene function that occur in the absence of changes in DNA sequence. Epigenetic mechanisms of gene control are important to orderly cell, tissue, and organismal development and the disruption of these mechanisms participates in the etiology of complex human disease. Topics include overview and concepts of epigenetics, histones and their modifications, DNA methylation, chromatin structure, RNAi, model organisms, nuclear transplantation and genome reprogramming, epigenetic and epigenomic technologies, and therapeutic agents that target epigenetic mechanisms.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Repeatable: Course can be repeated a maximum of 2 times.
Course typically offered:
Main Campus: Fall

PCOL 601B: Proteomics (1 unit)
Description: The qualitative and quantitative effects of drugs or toxic substances on mammalian proteins.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Repeatable: Course can be repeated a maximum of 2 times.
Recommendations and additional information: CHEM 325, CHEM 326 or equivalent.

PCOL 630A: Cellular Communications and Signal Transduction (3 units)
Description: Principles of molecular signaling regulating membrane, cytoplasmic, and nuclear events in eukaryotic cells. Topics include extracellular signals, intracellular transduction pathways, modulation of cell signaling, and biological processes controlled by specific signaling pathways.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Repeatable: Course can be repeated for a maximum of 6 units.
Equivalent to: CBIO 630A
Also offered as: CBIO 630A
Course typically offered:
Main Campus: Spring

Recommendations and additional information: BIOC 462A, BIOC 462B, BIOC 511.

PCOL 631: Pharmacogenetics/Pharmacogenomics (2 units)
Description: Pharmacogenomics is the study of the factors in a cell, tissue, organ or person, that determine variability in drug response. Among these factors are genetic differences between people, hence the term pharmacogenetics. This course will present the underlying biology behind pharmacogenomics, and include a significant component of instruction in genomic data analysis, taught in a computer laboratory, using actual real-world pharmacogenomic data sets.
Grading basis: Student Option ABCDE/PF
Career: Graduate
Course Components: Lecture Required
Equivalent to: CBIO 631
Also offered as: CBIO 631
Recommendations and additional information: Consent of instructor.

PCOL 670: Principles of Perfusion Techniques I (5 units)
Description: An introduction to basic extracorporeal techniques through discussion of blood propelling devices, heat transfer, gas transfer, bio-materials, and perfusion pharmacology.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Equivalent to: PCOL 670, PCOL 670, PHCL 670, SURG 670, SURG 670
Also offered as: PHCL 670, SURG 670
Course typically offered:
Main Campus: Fall

Recommendations and additional information: PHCL 671. Open to majors only.
Home department: Pharmacology

PCOL 670A: Principles of Perfusion Sciences I (1 unit)
Description: This course is to provide the student with a thorough understanding of the physiological, pharmacological and pathophysiological principles and perfusion techniques related to heart disease, and cardiopulmonary bypass support. Examinations will cover lectures, text readings and lecture notes.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Also offered as: PHCL 670A, SURG 670A
Course typically offered:
Main Campus: Summer 1 and Summer 2

Home department: Pharmacology

PCOL 670B: Principles of Perfusion Sciences I (4 units)
Description: This course is to provide the student with a thorough understanding of the physiological, pharmacological and pathophysiological principles and perfusion techniques related to heart disease, and cardiopulmonary bypass support. The course will run concurrent with PHCL 671 and PHCL 691L Preceptorship. Examinations will cover lectures, text readings and lecture notes.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Also offered as: PHCL 670B, SURG 670B
Course typically offered:
Main Campus: Fall

Home department: Pharmacology

PCOL 695A: Research Conference (1 - 3 units)
Grading basis: Regular Grades
Career: Graduate
Course Components: Colloquium Required
Repeatable: Course can be repeated for a maximum of 33 units.
Course typically offered:
Main Campus: Fall, Spring

PCOL 695C: Readings in Cancer Immunology (1 - 2 units)
Description: This course will focus on the analysis and discussion of current basic and clinical immunological studies of cancer in the literature and on the search for ways to control the disease. Immunological surveillance plays an important role in cancer. Dysregulation of the immune system contributes to the poorer outcome in the disease.
Grading basis: Regular Grades
Career: Graduate
Course Components: Colloquium Required
Equivalent to: CBIO 695C, MBIM 695C, PCOL 695C
Also offered as: CBIO 695C, IMB 695C
Course typically offered:
Main Campus: Spring

Recommendations and additional information: MIC 419.
Home department: Immunobiology

PCOL 695D: Regulatory Science (1 unit)
Description: Course is led by the director of the Regulatory Science Consultative Service along with RSCS fellows. For each module in the Foundations seminars, there will be a case-study discussion led by a UA scientist, contributing domain-specific expertise. The colloquia series will draw on campus speakers, as well as scholars, industry leaders and regulators nationwide.
Grading basis: Regular Grades
Career: Graduate
Course Components: Colloquium Required
Repeatable: Course can be repeated a maximum of 2 times.
Also offered as: LAW 695D, NURS 695D, PHPM 695D, PHSC 695D
Course typically offered:
Main Campus: Fall, Spring

Home department: Law

PCOL 696A: Student Research (1 unit)
Description: The development and exchange of scholarly information, usually in a small group setting. The scope of work shall consist of research by course registrants, with the exchange of the results of such research through discussion, reports, and/or papers.
Grading basis: Regular Grades
Career: Graduate
Course Components: Seminar Required
Repeatable: Course can be repeated a maximum of 10 times.
Equivalent to: PHCL 696A, TOX 696A
Also offered as: PHSC 696A
Course typically offered:
Main Campus: Fall, Spring

PCOL 699: Independent Study (1 - 5 units)
Description: Qualified students working on an individual basis with professors who have agreed to supervise such work. Graduate students doing independent work which cannot be classified as actual research will register for credit under course number 599, 699, or 799.
Grading basis: Alternative Grading: S, P, F
Career: Graduate
Course Components: Independent Study Required
Repeatable: Course can be repeated a maximum of 99 times.
Course typically offered:
Main Campus: Fall, Spring, Summer

PCOL 821: Case Studies in Pharmacology (1 unit)
Description: Contemporary issues in pharmacology and the related disciplines of toxicology, physiology, and immunology will be discussed in a case study format. Relates concepts and mechanisms with disease states and drug therapy.
Grading basis: Regular Grades
Career: Pharmacy
Course Components: Lecture Required
Course typically offered:
Main Campus: Spring

Recommendations and additional information: Open to majors only.

PCOL 824: Introduction to Pharmacology and Medicinal Chemistry (3 units)
Description: The goals of this course are to teach you the principles of pharmacology and medicinal chemistry to give you a basic working knowledge of all the major classes of drugs that are in therapeutic use today. This knowledge will focus on the mechanisms of drug action, drug structure/activity relationships, major therapeutic indications, and potential drug interactions and side effects. The need and importance of continuing education will be emphasized, as the therapeutic use of drugs is an ever-changing field.
Grading basis: Regular Grades
Career: Pharmacy
Course Components: Lecture Required
Course typically offered:
Main Campus: Spring
Phoenix Campus: Spring

Enrollment requirement: PCOL 832

PCOL 825A: Pharmacology 1 (2 units)
Description: Pharmacology is a basic science concerned with all aspects of the action of drugs on living systems. In its entirety, pharmacology embraces biochemical and physiological effects, mechanisms of action, pharmacokinetics, and therapeutic and diagnostic uses of drugs. A strong working knowledge of pharmacology is essential to the professional role of pharmacists and to basic scientists engaged in drug discovery and understanding how drugs work.
Grading basis: Regular Grades
Career: Pharmacy
Course Components: Lecture Required
Course typically offered:
Main Campus: Fall
Online Campus: Fall
Phoenix Campus: Fall

Enrollment requirement: PCOL 824 must be completed prior to enrolling in PCOL 825A.

PCOL 825B: Pharmacology 2 (2 units)
Description: Pharmacology is a basic science concerned with all aspects of the action of drugs on living systems. In its entirety, pharmacology embraces biochemical and physiological effects, mechanisms of action, pharmacokinetics, and therapeutic and diagnostic uses of drugs. A strong working knowledge of pharmacology is essential to the professional role of pharmacists and to basic scientists engaged in drug discovery and understanding how drugs work.
Grading basis: Regular Grades
Career: Pharmacy
Course Components: Lecture Required
Course typically offered:
Main Campus: Spring
Online Campus: Spring
Phoenix Campus: Spring

Enrollment requirement: PCOL 824 must be completed prior to enrolling in PCOL 825A.

PCOL 826A: Medicinal Chemistry I (2 units)
Description: PCOL 826A and PCOL 826B represent two one-semester courses in sequence dealing with fundamental aspects of the chemistry of medicinal agents. PCOL 826A is a two-unit course presented in the fall semester and PCOL 826B is a two-unit course presented in the spring semester.
Grading basis: Regular Grades
Career: Pharmacy
Course Components: Lecture Required
Course typically offered:
Main Campus: Fall

Enrollment requirement: PCOL 832 must be completed before enrollment in PCOL 826A.

PCOL 826B: Medicinal Chemistry 2 (2 units)
Description: PCOL 826A and PCOL 826B represent two one-semester courses in sequence dealing with fundamental aspects of the chemistry of medicinal agents. PCOL 826A is a two-unit course presented in the fall semester and PCOL 826B is a two-unit course presented in the spring semester.
Grading basis: Regular Grades
Career: Pharmacy
Course Components: Lecture Required
Course typically offered:
Main Campus: Spring
Online Campus: Spring
Phoenix Campus: Spring

Field trip: Not applicable
Enrollment requirement: PCOL 826A

PCOL 832: Biomolecular Basis of Pharmacotherapy (4 units)
Description: The purpose of the proposed course is to tailor the learning of basic principles of biochemistry and molecular biology so that they can be presented in the context of (i) human inter-organ relationships, (ii) transitions between different metabolic states such as fed and fasted, and (iii) in the context of numerous clinical examples where pharmacotherapy must consider inter-organ relationships and different metabolic states in order to be effective. The best example of where this approach is needed relates to the emerging epidemic called "metabolic syndrome", where the doctor of pharmacy must deal the very difficult task of managing therapy of patients with abnormalities in blood glucose, blood pressure, blood lipids, and more, which normally requires management of multiple drug therapies termed "poly pharmacy". Thus, while the scope of the course includes acquisition of basic principles of the biochemistry of carbohydrates, proteins, lipids, nucleic acids, etc, this information will be taught in a context specifically tailored for the future needs of the professional pharmacy student.
Grading basis: Regular Grades
Career: Pharmacy
Course Components: Lecture Required
Course typically offered:
Main Campus: Fall

PCOL 838A: Clinical Pathophysiology I (2 units)
Description: Basic and clinical pathophysiology is becoming redefined with a wealth of knowledge at the cellular and genetic levels. Whole organ physiology and the etiology of disease and disorders of organ systems is a fundamental pillar essential to students and professionals in the health care arena. This course covers relevant cell and organ physiology, genetics, biochemistry, pathology and pathophysiology and other pivotal knowledge areas to aid students in complex disease processes and therapeutic interventions. This course will prepare students to be knowledgeable practitioners in the ever-advancing health care environment to improve the human condition. Knowledge of pathophysiology is essential to the professional role of the pharmacist as a consultant to the health care community and to the patient.
Grading basis: Regular Grades
Career: Pharmacy
Course Components: Lecture Required
Course typically offered:
Main Campus: Fall
Phoenix Campus: Fall

PCOL 838B: Clinical Pathophysiology II (2 units)
Description: Basic and clinical pathophysiology is becoming redefined with a wealth of knowledge at the cellular and genetic levels. Whole organ physiology and the etiology of disease and disorders of organ systems is a fundamental pillar essential to students and professionals in the health care arena. This course covers relevant cell and organ physiology, genetics, biochemistry, pathology and pathophysiology and other pivotal knowledge areas to aid students in complex disease processes and therapeutic interventions. This course will prepare students to be knowledgeable practitioners in the ever-advancing health care environment to improve the human condition. Knowledge of pathophysiology is essential to the professional role of the pharmacist as a consultant to the health care community and to the patient.
Grading basis: Regular Grades
Career: Pharmacy
Course Components: Lecture Required
Course typically offered:
Main Campus: Spring, Summer 1 & Summer 2
Phoenix Campus: Spring, Summer 1 & Summer 2

PCOL 874: Clinical Toxicology (2 units)
Description: Prevention, characteristics, diagnosis and rational management of diseases caused by drug overdose, toxic household products, poisonous plants, venomous animals, environmental and industrial toxicants.
Grading basis: Regular Grades
Career: Pharmacy
Course Components: Lecture Required
Co-convened with: PCOL 574
Course typically offered:
Main Campus: Spring

PCOL 897A: Writing and Publishing a Review Article (2 units)
Description: The purpose of this course is to research, write and submit a manuscript (review article) in English for publication in a refereed scientific journal.
Grading basis: Regular Grades
Career: Pharmacy
Course Components: Workshop Required
Course typically offered:
Main Campus: Fall

Recommendations and additional information: Successful completion of the second professional year of the PharmD program.

PCOL 899: Independent Study (1 - 6 units)
Description: Qualified students working on an individual basis with professors who have agreed to supervise such work.
Grading basis: Alternative Grading: S, P, F
Career: Pharmacy
Course Components: Independent Study Required
Repeatable: Course can be repeated a maximum of 99 times.
Course typically offered:
Main Campus: Fall, Spring

PCOL 900: Research (1 - 12 units)
Description: Individual research, not related to thesis or dissertation preparation, by graduate students.
Grading basis: Alternative Grading: S, P, F
Career: Graduate
Course Components: Independent Study Required
Repeatable: Course can be repeated a maximum of 99 times.
Course typically offered:
Main Campus: Fall, Spring, Summer

PCOL 910: Thesis (1 - 12 units)
Description: Research for the master's thesis (whether library research, laboratory or field observation or research, artistic creation, or thesis writing). Maximum total credit permitted varies with the major department.
Grading basis: Alternative Grading: S, P, F
Career: Graduate
Course Components: Independent Study Required
Repeatable: Course can be repeated a maximum of 99 times.
Course typically offered:
Main Campus: Fall, Spring, Summer

PCOL 920: Dissertation (1 - 9 units)
Description: Research for the doctoral dissertation (whether library research, laboratory or field observation or research, artistic creation, or dissertation writing).
Grading basis: Alternative Grading: S, P, F
Career: Graduate
Course Components: Independent Study Required
Repeatable: Course can be repeated a maximum of 99 times.
Course typically offered:
Main Campus: Fall, Spring, Summer