

PHARMACEUTICAL SCIENCES (PHSC)

PHSC 5920 - Medicinal Chemistry (3 Credits)

This course explores medicinal chemistry concepts using clinically relevant case studies, designed to examine mechanism(s) of drug action, structure-activity relationships, drug metabolism, drug resistance and other concepts related to the pharmacology and clinical use of therapeutic drugs.

Grading Basis: Letter Grade

Typically Offered: Spring.

PHSC 6015 - Clinical Pharmacokinetics (3 Credits)

The influence of physiological and pathophysiological factors on drug disposition is considered. Knowledge gained allows students to calculate appropriate dosing of drugs in patients and anticipate how drug doses should be adjusted in disease and the presence of other drugs.

Crosslisted with PHRD 6015.

Grading Basis: Letter Grade

Repeatable. Max Credits: 3.

A-GRAD Restricted to graduate students only.

Typically Offered: Fall.

PHSC 6710 - Cannabis Therapeutics: Neurology & Mental Health (2 Credits)

The evidence-based risks and benefits of cannabis and/or FDA-approved and investigational cannabis-derived drugs will be discussed in epilepsy and movement disorders, sleep, and migraine. Cannabis use in various mental health conditions will be presented, including depression, anxiety, post-traumatic stress, and schizophrenia. Requisite: Crosslisted with PCSM 6710.

Grading Basis: Letter Grade

Repeatable. Max Credits: 2.

A-GRAD Restricted to graduate students only.

Typically Offered: Fall.

PHSC 6720 - Cannabis Therapeutics: Pain, Oncology, At-Risk Populations (2 Credits)

The evidence-based risks and benefits of cannabis and/or FDA-approved and investigational cannabis-derived drugs will be discussed in management of various types of pain, and their supportive role in oncology. Patient safety considerations, including drug-cannabis interactions, and at-risk populations with cannabis use will be presented. Crosslisted with PCSM 6720

Grading Basis: Letter Grade

Repeatable. Max Credits: 2.

A-GRAD Restricted to graduate students only.

Typically Offered: Spring.

PHSC 6730 - Legal & Regulatory Issues in Cannabis Medicine (2 Credits)

The legal history of cannabis and industrial hemp in the United States and the current diversity of state and federal regulations governing the sale and use of cannabis and cannabis-derived medicinal and retail products will be discussed, as well as how these regulations influence basic science and clinical research on cannabis. Crosslisted with PCSM 6730.

Grading Basis: Letter Grade

Repeatable. Max Credits: 2.

A-GRAD Restricted to graduate students only.

Typically Offered: Spring.

PHSC 6840 - Master's Research Rotation in Pharmaceutical Sciences (1-6 Credits)

This rotation provides an opportunity for MS in Pharmaceutical Sciences students to gain research experience prior to selecting a thesis laboratory.

Grading Basis: Letter Grade

Repeatable. Max Credits: 18.

A-GRAD Restricted to graduate students only.

Typically Offered: Fall, Spring, Summer.

PHSC 6856 - Master's Independent Study (1-4 Credits)

Grading Basis: Letter Grade

Repeatable. Max Credits: 4.

PHSC 6950 - Master's Thesis in Pharmaceutical Sciences (1-10 Credits)

This course is for the conduct of thesis research, writing, and defense of an original research project by students in the MS in Pharmaceutical Sciences program. A minimum of 6 credits are required for program completion.

Grading Basis: Letter Grade with IP

Repeatable. Max Credits: 10.

A-GRAD Restricted to graduate students only.

Additional Information: Report as Full Time.

Typically Offered: Fall, Spring, Summer.

PHSC 6990 - Capstone Project in Pharmaceutical Sciences (1-3 Credits)

Students in the MS in Pharmaceutical Sciences program will complete a capstone, literature review paper under faculty mentor guidance in their specialty area of cannabis science & medicine, clinical pharmacokinetics & pharmacodynamics, drug discovery, molecular & systems toxicology, or pharmaceutical biotechnology & drug delivery.

Grading Basis: Letter Grade with IP

Typically Offered: Fall, Spring, Summer.

PHSC 7025 - Pharmacogenomics (2 Credits)

This course provides students with an understanding of how genetic factors influence drug disposition, response, and adverse effects.

Knowledge gained from this course will enhance students' ability to apply genetic information to pharmacy practice and select the most appropriate therapeutic intervention(s). Crosslisted with PHRD 7025.

Grading Basis: Letter Grade

A-GRAD Restricted to graduate students only.

Typically Offered: Fall.

PHSC 7305 - Hands On Proteomics Workshop (1 Credit)

4-day intensive hands-on workshop designed to provide comprehensive view of proteomics. Appropriate for individuals with little/no experience in mass spectrometry and/or high performance liquid chromatography. Participants learn introductory proteomics science and applicable protocols/technologies through extensive hands-on experience.

Prerequisite: IDPT 7811, IDPT 7812, IDPT 7813, IDPT 7814, IDPT 7815 and Instructor permission.

Grading Basis: Letter Grade

A-GRAD Restricted to graduate students only.

Typically Offered: Fall, Spring, Summer.

PHSC 7310 - Fundamentals of Pharmaceutical Sciences I (3 Credits)
Core course explores key aspects of Pharmaceutical Sciences. Major themes will focus on macromolecular interactions, pharmaceuticals, pharmacokinetics, pharmacodynamics, apoptosis, signal transduction and immunology. Critical thinking and problem solving skills will be emphasized via lectures, discussions and computer-based data analyses. Crosslisted with TXCL 7310.

Grading Basis: Letter Grade

A-GRAD Restricted to graduate students only.

Typically Offered: Fall.

PHSC 7312 - Fundamentals Doctoral Recitation I (1 Credit)

This is a one-credit course designed to complement PHSC 7310. While the didactic lectures of Fundamentals are essential for foundational knowledge in Toxicology and the Pharmaceutical Sciences, this course provides an opportunity for analytical and critical thinking and detailed discussion of experimental design and data interpretation. Intended to be taken the same semester as PHSC 7310 but can be taken alone by PHSC-MS students who've been admitted to the PHSC-PhD program.

Grading Basis: Letter Grade with IP

Repeatable. Max Credits: 1.

A-GRAD Restricted to graduate students only.

Typically Offered: Fall.

PHSC 7315 - Fundamentals of Pharmaceutical Sciences II (3 Credits)

Core course explores key aspects of Pharmaceutical Sciences. Major themes will focus on drug delivery and imaging systems, protein therapeutics, and the drug discovery process. Critical thinking and problem solving skills will be emphasized via lectures, discussions and computer-based data analyses. Crosslisted with TXCL 7315.

Grading Basis: Letter Grade

Repeatable. Max Credits: 3.

A-GRAD Restricted to graduate students only.

Typically Offered: Spring.

PHSC 7317 - Fundamentals Doctoral Recitation II (1 Credit)

This is a one-credit course designed to complement PHSC 7315. While the didactic lectures of Fundamentals are essential for foundational knowledge in Toxicology and the Pharmaceutical Sciences, this course provides an opportunity for analytical and critical thinking and detailed discussion of experimental design and data interpretation. Intended to be taken the same semester as PHSC 7315 but can be taken alone by PHSC-MS students who've been admitted to the PHSC-PhD program.

Grading Basis: Letter Grade

Repeatable. Max Credits: 1.

A-GRAD Restricted to graduate students only.

Typically Offered: Spring.

PHSC 7320 - Physical Pharmacy & Pharmaceutical Sciences (3 Credits)

This course is designed to provide students with a thorough overview of physical chemical principles vital to the Pharmaceutical Sciences; a course for someone whose research efforts will involve pharmaceutical development and/or the evaluation of drugs. Cross list with TXCL 7320.

Grading Basis: Letter Grade

Repeatable. Max Credits: 3.

A-GRAD Restricted to graduate students only.

Typically Offered: Spring.

PHSC 7326 - Seminar in Clinical Pharmacokinetics & Pharmacodynamics (2 Credits)

This course will comprise discussions and presentations of contemporary journal articles, or research in progress related to clinical pharmacokinetics and pharmacodynamics. Discusses current literature and research in the pharmaceutical sciences. Requisites: Required for MS Pharmaceutical Sciences grad students in conjunction with attendance at all seminars in the Dept. of Pharmaceutical Sciences (DOPS) Graduate Program Seminar Series. Two-term course, 2 credits each term, must attend both terms to receive grade.

Grading Basis: Letter Grade with IP

Repeatable. Max Credits: 4.

A-GRAD Restricted to graduate students only.

Typically Offered: Fall, Spring.

PHSC 7328 - Computational Design in Drug Discovery (3 Credits)

This course covers the theory and application of computational modeling to drug design and development. Students will be trained in multiple computational techniques and will perform an independent drug design project to be presented at the end of the course.

Grading Basis: Letter Grade

A-GRAD Restricted to graduate students only.

Typically Offered: Fall, Spring.

PHSC 7330 - Development of Drugs and Biologics (3 Credits)

A survey course designed to introduce students to pharmacokinetic and pharmacodynamics principals used in drug research and development by faculty of the Skaggs School of Pharmacy, Department of Pharmaceutical Sciences. The Phoenix Winnonlin Computer software, is used to complete homework. Offered in Fall only in even-numbered years. Crosslisted with TXCL 7330.

Grading Basis: Letter Grade

A-GRAD Restricted to graduate students only.

Typically Offered: Fall.

PHSC 7340 - Molecular Biophysics and Enzymology (2 Credits)

This course will present advanced topics in thermodynamics, kinetics, macromolecular interactions, and enzymology. Underlying theory and applications as found in the literature will be discussed. It is intended for those with a specialized research interest in the subject. Prerequisite: For students in the Pharmaceutical Sciences with research interest in subject

Grading Basis: Letter Grade

A-GRAD Restricted to graduate students only.

Typically Offered: Fall.

PHSC 7345 - Nanotechnology & Drug Delivery (2 Credits)

Course presents physicochemical and biological principles of drug delivery including drug delivery system design for various applications. In addition it will address principles of nanotechnology related to the design of nanosize delivery systems intended for drug delivery, imaging and diagnosis. Offered in Spring only in odd-numbered years. Crosslisted with BIOE 7345.

Grading Basis: Letter Grade

A-GRAD Restricted to graduate students only.

Typically Offered: Spring.

PHSC 7400 - Ethical Issues in Toxicology & Pharmaceutical Sciences (1 Credit)

The purpose of this course is to expose students to ethical issues in the fields of toxicology and pharmaceutical sciences. Emphasis will be placed on research conduct, animal use, and other timely issues relevant in these fields. Crosslisted: TXCL 7400.

Grading Basis: Letter Grade

A-GRAD Restricted to graduate students only.

Typically Offered: Fall.

PHSC 7405 - Hands-On Metabolomics Workshop (1 Credit)

A 4-day intensive hands-on workshop that provides a comprehensive view of metabolomics. Participants will learn introductory metabolomics science and applicable protocols/technologies. Appropriate for individuals with little to no experience in mass spectrometry and who will use this technology in their research. Requisite- One year of full-time biomedical graduate study and instructor permission

Grading Basis: Letter Grade

Typically Offered: Fall, Spring.

PHSC 7452 - Introduction to Clinical Pharmacology (3 Credits)

The course provides students with a foundational knowledge of clinical pharmacology, including pharmacokinetics, drug metabolism, assessment of drug effects, optimizing patient therapy and drug discovery and development. It is grounded in weekly topical lectures, supplemented by readings, discussion and assignments. Requisite: Permission of Course Director.

Grading Basis: Letter Grade

A-GRAD Restricted to graduate students only.

Typically Offered: Fall, Spring.

PHSC 7565 - Applied Statistics for Pharm Science and Toxicology (2 Credits)

Students will learn several basic statistical techniques for analyzing data including when and how to use them, the appropriate assumptions for these methods, and how to clearly articulate their statistical results in the context of toxicology and pharmaceutical sciences studies. Prerequisite: Pharmaceutical Sciences and Toxicology graduate students

Grading Basis: Letter Grade

Typically Offered: Fall.

PHSC 7568 - Seminar in the Pharmaceutical Sciences (2 Credits)

Discusses current literature and research in the pharmaceutical sciences. Requisites: Required for 1st through 3rd year MS and PhD Pharmaceutical Sciences students in conjunction with attendance at all seminars in the Dept. of Pharmaceutical Sciences (DOPS) Graduate Program Seminar Series.

Grading Basis: Letter Grade

Repeatable. Max Credits: 6.

A-GRAD Restricted to graduate students only.

Typically Offered: Fall, Spring.

PHSC 7608 - Molecular Interactions (3 Credits)

Provides chemical/physical basis for protein structure, folding, function & stability; presents methods/principles of protein/peptide purification & enzyme catalysis including electron transfer & mutagenesis. The role of molecular dynamics & use of molecular simulations in the investigations of protein-ligand/protein-protein interactions. Cross listed with STBB 7608.

Grading Basis: Letter Grade

Typically Offered: Spring.

PHSC 7609 - Biophysics & Spectroscopy (1.5 Credits)

This course will teach fundamentals of modern molecular spectroscopies and biophysical techniques as applied to biomolecules and the structural/dynamic information they afford. Cross listed with STBB 7609.

Grading Basis: Letter Grade

Typically Offered: Spring.

PHSC 7619 - Biophysics and Spectroscopy Lab (1 Credit)

This course aims to provide the students hands-on training in the use of a variety of biophysical techniques for the quantification of biomolecular interactions. Coreq: STBB 7609.

Grading Basis: Letter Grade

Typically Offered: Spring.

PHSC 7650 - Research Rotation Pharmaceutical Sciences (1-10 Credits)

Research work in pharmaceutical sciences. Prereq: Consent of Instructor.

Grading Basis: Letter Grade with IP

Repeatable. Max Credits: 10.

A-GRAD Restricted to graduate students only.

Typically Offered: Fall, Spring, Summer.

PHSC 7651 - Pharmaceutical Biotechnology (3 Credits)

Course covers role of bioengineering in development of pharmaceutical biotechnology products. In particular, the student will learn to apply solution thermodynamics as well as mass and heat transfer concepts to the stabilization/formulation of macromolecules and production of drug delivery systems. Crosslisted: CU Boulder CHEN 5900.

Grading Basis: Letter Grade

A-GRAD Restricted to graduate students only.

Typically Offered: Fall.

PHSC 7653 - Protein Formulation (2 Credits)

This course will provide instruction in rational design of stable therapeutic protein formulations with emphasis on the practical and mechanistic aspects of developing aqueous solution and freeze-dried formulations. Students will read papers from the literature and participate in critical discussions.

Grading Basis: Letter Grade

A-GRAD Restricted to graduate students only.

Typically Offered: Spring.

PHSC 7658 - Advanced Topics in Pharmaceutical Sciences (1-5 Credits)

Considers special topic of current interest in pharmaceutical sciences. Course may be repeated for credit with the instructor's approval.

Restriction: Consent of Instructor.

Grading Basis: Letter Grade

Repeatable. Max Credits: 6.

A-GRAD Restricted to graduate students only.

Typically Offered: Fall, Spring.

PHSC 7660 - Liposome-based Drug Delivery (2 Credits)

This literature-based course briefly reviews the fundamental physicochemical characteristics of lipid membranes and then rigorously discusses how these properties are exploited for drug delivery. This course focuses on how current liposome technology overcomes the barriers to successful delivery. Offered in Spring only in even-numbered years.

Grading Basis: Letter Grade

A-GRAD Restricted to graduate students only.

Typically Offered: Spring.

PHSC 7665 - Pharmacokinetic Principles & Applications (3 Credits)

A survey course to introduce students to pharmacokinetic and pharmacodynamics principles used in drug research and development. Taught by faculty from the School of Pharmacy, Department of Pharmaceutical Sciences. Phoenix Winnonlin Computer software will be used in the course. Cross-listed with TXCL 7665

Grading Basis: Letter Grade

A-GRAD Restricted to graduate students only.

Typically Offered: Spring.

PHSC 7667 - Population Pharmacokinetic Modeling (3 Credits)

This course will allow students to gain knowledge, expertise and experience with population pharmacokinetic (PK) and pharmacodynamic (PD) models and software used to perform data analysis. Students will have the opportunity to practice their modeling skills while being introduced to a broad range of relevant approaches. Requisite: Prerequisite: PHSC 7665 - Pharmacokinetic Principles & Applications
Grading Basis: Letter Grade
Typically Offered: Fall.

PHSC 7700 - Cannabis Pharmacology & Physiology (3 Credits)

This course addresses the history, botany, medicinal chemistry and pharmacology of active constituents in cannabis and hemp, with particular emphasis on their interplay with endogenous cannabinoids and the endocannabinoid system of the body. FDA-approved cannabinoid products and synthetic cannabinoids will also be discussed.
Grading Basis: Letter Grade
Typically Offered: Fall, Spring.

PHSC 7705 - Scientific Writing in Cannabis Science & Medicine (1 Credit)

This practical course will cultivate the students' ability to communicate scientific and regulatory information to appropriate audiences, ranging from the general public to the cannabis industry and state agencies who regulate cannabis.
Grading Basis: Letter Grade
Typically Offered: Spring.

PHSC 7710 - Chemical Analysis of Cannabis (2 Credits)

This course will review the current state of cannabis research methodologies, including the extraction of plant materials, biochemical analysis and isolation of bioactive constituents. This didactic component will also include practical considerations of cannabis chemistry and research applications.
Grading Basis: Letter Grade
Typically Offered: Spring.

PHSC 7711 - Chemical Analysis of Cannabis Laboratory (1 Credit)

This laboratory companion course of PHSC/PCSM 7710 will provide practical experience with the extraction of plant materials spiked with cannabinoid reference standards, separation techniques, isolation and quantification of bioactive compounds, and mass spectrometry methods for compound identification. Requisite: PHSC 7710 or PCSM 7710 must be taken first or concurrently.
Grading Basis: Letter Grade
Typically Offered: Spring.

PHSC 7720 - Seminar in Cannabis Science & Medicine (2 Credits)

This course allows students to practice critical thinking about literature pertinent to the pharmaceutical sciences, with a focus on cannabis science and medicine. The overall goal is to broaden students' scientific knowledge and provide practical experience in the critical evaluation and discussion of current and historical literature. Requisites: Required attendance at all seminars in the Dept. of Pharmaceutical Sciences (DOPS) Graduate Program Seminar Series. Must be taken in two terms, 2 credits each term.
Grading Basis: Letter Grade with IP
A-GRAD Restricted to graduate students only.
Typically Offered: Fall, Spring.

PHSC 8990 - Doctoral Thesis (1-10 Credits)

Doctoral thesis work in pharmaceutical sciences. Prereq: Consent of Instructor.
Grading Basis: Letter Grade with IP
Repeatable. Max Credits: 99.
A-GRAD Restricted to graduate students only.
Additional Information: Report as Full Time.
Typically Offered: Fall, Spring, Summer.