

PHARMACOLOGY (PHT)

PHT 305 Fundamentals of Pharmacology (3 credits)

Basic principles and therapeutic approaches to the treatment of diseases. Students will be introduced to the role and actions of drugs and their classes as they relate to biological receptors, disease, health, and body systems.

PHT 306 Biomethods in Pharmac & Tox (3 credits)

Survey of biological methods employed in pharmacology and toxicology to assess efficacy and safety of drugs and chemicals. Experiments are designed to illustrate pharmacological principles and to detect and evaluate potential local and systemic toxicities.

PHT 307 Introduction to Toxicology (2 credits)

This course introduces the basic principles of the effects of toxic substances on biological systems, including consideration of the history, scope, and applications of toxicology, toxicant exposure, the mechanisms of toxic action, some major types of toxicants, and fundamental methods of toxicology studies. Students will apply the basic principles of toxicology to evaluate the safety risks in preclinical, environmental, and forensic studies and practices.

PHT 320 Techniques in Pharmacol & Tox (2 credits)

A laboratory course designed to familiarize students with standard methodology used to assess drug and chemical safety.

Restrictions: Enrollment is limited to Undergraduate Division level students.

PHT 340 Intro Neuropsychopharmacology (3 credits)

This course will provide a working knowledge of the neurobiological and neurochemical basis of behavior and the mechanism by which drugs influence synaptic neurotransmission to alter behavior and function in neurologic and psychiatric disorders.

Restrictions: Enrollment is limited to Undergraduate Division level students.

Attributes: Undergraduate

PHT 402 Advanced Pharmacology (3 credits)

This undergraduate level course will introduce concepts involved in drug discovery and development with an emphasis on drug actions in the body. Principles of medicinal chemistry, pharmacokinetics, pharmacodynamics and pharmacogenomics will be explored from a theoretical standpoint with integration of chemical and biological principles. This course engages students to think critically through medicinal chemistry concepts and designs including functional groups, isomerism, bonding, physicochemical properties, salts, and prodrugs while being able to delve into examples of structure activity relationships with regard to interactions between drugs and their targets. A large emphasis on interaction between a ligand and its target (receptors, signaling cascades, second messengers, enzymes, transporters, etc.) and methodology and experimental design at the preclinical level describing the processes and parameters that determine absorption, distribution, metabolism, and excretion/elimination (ADME) of chemicals will also be covered.

Prerequisites: CHM 210 and CHM 215 and BIO 101 and BIO 102

Attributes: Undergraduate

PHT 403 Advanced Toxicology (3 credits)

This course introduces the biochemical, genetic, cellular basis of cytotoxicity associated with current treatment therapies (small molecules, biologics and cell gene therapy etc.). Based on this knowledge, the course will study the toxic effects and their underlying mechanisms in different organ systems (e.g., liver, kidney, lung, eye, immunity, endocrine, and reproductive system). Emphasis on key adverse effects of cell gene therapy will also be introduced. In this course students will learn to link the toxicology branch of therapies and medications to the regulatory aspect of the drug development process inclusive of cell gene therapy.

Restrictions: Enrollment is limited to Undergraduate Division level students.

Attributes: Undergraduate

PHT 405 Pharmacology in Drug Discovery (3 credits)

This course will describe pharmacological classes of therapeutic agents with emphasis on mechanisms of actions and medicinal chemistry as well as introducing the therapies included in the rapidly expanding Cell Gene and Therapy (CART drug product formulation) and key biologics (large protein molecules). The students will learn the mechanisms of actions and medicinal chemistry linked to effectiveness and side effects of these current therapies. Structure activity function related to drug design will also be introduced for several drugs discussed. Students will also participate in interactive learning related to special topics in pharmacology through engaging discussions guided by relevant and high impact literature.

Prerequisites: CHM 210 and CHM 215 and BIO 101 and BIO 102

Attributes: Undergraduate

PHT 407 Tox Subst Use Disorder (Appld) (3 credits)

Students will develop a working knowledge of the key neurotransmitters and mechanisms involved in substance use disorders. They will also explore the neurobiological and neurochemical theories proposed for different types of substance use disorders. Students will delve into the neurotoxicology of both the central and peripheral nervous systems, as well as gain insights into the principles of drug metabolism for substances with abuse potential. Lastly, they will examine the mechanisms through which substance use can modify behavior and mood, ultimately leading to the development of disease states.

Prerequisites: CHM 210 and CHM 215 and BIO 101 and BIO 102

Attributes: Undergraduate

PHT 421 Advanced Medicinal Chem/Pharm (4 credits)

This course will introduce concepts involved in drug actions in the body. Principles of medicinal chemistry, pharmacokinetics, pharmacodynamics and pharmacogenomics will be explored from a theoretical standpoint with integration of chemical and biological principles.

Restrictions: Enrollment is limited to Undergraduate Division level students.

Attributes: Undergraduate

PHT 440 Drug Disc Neurodegenerative (3 credits)

The goal of this course is to examine the drug discovery process for neurodegenerative disorders. Using Alzheimer's disease as a model, we will examine the diagnosis, epidemiology, current therapeutics, and strategies for drug discovery. The in vitro disease models with resulting outcomes in translational studies will be discussed. At the end of the course students will utilize NIH guidelines to develop their own proposal for future studies.

PHT 450 Analysis of Publications (1-3 credits)

The purpose of this course is to use the information learned from retracted scientific papers in the medical/pharmaceutical field to teach many aspects of scientific publication. The class will discuss the specific reasons for the retractions, for example, errors in data, plagiarism, or fraudulent data including manipulated photo images. Using data from subsequent publications that led to the particular retraction, we will analyze the original data in terms of the rigor of statistics, reproducibility, and hints of data manipulation. We will also analyze the impact of the retracted papers on the scientific concepts and to public health. A retracted paper means that the particular data no longer exist in the literature; therefore in this course, we will discuss the ethics and responsibility of authorship, including coauthors. We will also discuss the process of scientific publication and the peer review process that varies widely among journals. Examples of the adverse consequences of retracted papers to medical science, to the biomedical community, and to the public at large will be given in class and discussed in terms of the responsibility of scientists and the ethics in scientific publications. For students electing to receive a letter grade in the course, two written assignments will be required.

Attributes: Undergraduate

PHT 470 Special Topics Pharmacology (4 credits)

This course will describe pharmacological classes of therapeutic agents with emphasis on mechanisms of actions at the cellular and organ levels. Students will also participate in interactive learning related to special topics in pharmacology.

Attributes: Undergraduate

PHT 471 Special Topics in Toxicology (3 credits)

This course considers special topics related to organ-specific pathology and applications of clinical toxicology. Special topics may include substance use disorders, cancer therapeutics, immunotherapy, nanotherapy, and the toxicology of medical devices. The course will provide a working knowledge of toxicology principles that impact specific disease states and therapy.

PHT 495 Independent Research Project (1-4 credits)

This course is a research opportunity for students to work with a faculty mentor in the field of Drug Discovery & Development and Cell Gene Therapy to gain insight and skills in research literature interpretation, hypothesis testing, laboratory measures, and data analysis, as well as research summarization and conclusion generation, with poster preparation and data presentation to a broad audience. Faculty mentor and student should agree upon the specific objectives and expectations for the course at the beginning of the course. This course can be taken multiple times to satisfy free electives.

Attributes: Undergraduate

PHT 702 Advanced Pharmacology (3 credits)

This graduate level course will introduce concepts involved in drug discovery and development with an emphasis on drug actions in the body. Principles of medicinal chemistry, pharmacokinetics, pharmacodynamics and pharmacogenomics will be explored from a theoretical standpoint with integration of chemical and biological principles. This course engages students to think critically through medicinal chemistry concepts and designs including functional groups, isomerism, bonding, physicochemical properties, salts, and prodrugs while being able to delve into examples of structure activity relationships with regard to interactions between drugs and their targets. A large emphasis on interaction between a ligand and its target (receptors, signaling cascades, second messengers, enzymes, transporters, etc.) and methodology and experimental design at the preclinical level describing the processes and parameters that determine absorption, distribution, metabolism, and excretion/elimination (ADME) of chemicals will also be covered.

Restrictions: Enrollment is limited to Doctoral or Graduate level students.

Attributes: Doctoral, Graduate

PHT 703 Advanced Toxicology (3 credits)

This graduate level course introduces the biochemical, genetic, cellular basis of cytotoxicity associated with current treatment therapies (small molecules, biologics and cell gene therapy etc.). Based on this knowledge, the course will study the toxic effects and their underlying mechanisms in different organ systems (e.g., liver, kidney, lung, eye, immunity, endocrine, and reproductive system). Emphasis on key adverse effects of cell gene therapy will also be introduced. In this course students will learn to link the toxicology branch of therapies and medications to the regulatory aspect of the drug development process inclusive of cell gene therapy.

Restrictions: Enrollment is limited to Doctoral or Graduate level students.

Attributes: Graduate

PHT 705 Pharmacology in Drug Discovery (3 credits)

This graduate level course will describe pharmacological classes of therapeutic agents with emphasis on mechanisms of actions and medicinal chemistry as well as introducing the therapies included in the rapidly expanding Cell Gene and Therapy (CART drug product formulation) and key biologics (large protein molecules). The students will learn the mechanisms of actions and medicinal chemistry linked to effectiveness and side effects of these current therapies. Structure activity function related to drug design will also be introduced for several drugs discussed. Students will also participate in interactive learning related to special topics in pharmacology through engaging discussions guided by relevant and high impact literature.

Restrictions: Enrollment is limited to Doctoral or Graduate level students.

Attributes: Doctoral, Graduate

PHT 707 Tox Subst Use Disorder (Appld) (3 credits)

This graduate level course will develop a working knowledge of the key neurotransmitters and mechanisms involved in substance use disorders. They will also explore the neurobiological and neurochemical theories proposed for different types of substance use disorders. Students will delve into the neurotoxicology of both the central and peripheral nervous systems, as well as gain insights into the principles of drug metabolism for substances with abuse potential. Lastly, they will examine the mechanisms through which substance use can modify behavior and mood, ultimately leading to the development of disease states.

Restrictions: Enrollment is limited to Doctoral or Graduate level students.

Attributes: Doctoral, Graduate

PHT 709 Research Project Drug Discov (1-4 credits)

This graduate level course is interactive learning lab with capstone built to simulate an internship in industry projects and research. in Drug Discovery & Cell Gene Therapy. Students can either elect to research literature on topics guided by mentoring faculty and write a semester project paper (dissertation style) and give a presentation to content experts in the Department (self-paced) or can choose to engage in a research faculty's research (drug discovery or cell gene therapy) to gain experience on hands on techniques utilized in the research and field of drug discovery and present their research findings through a semester project paper and presentation.

Restrictions: Enrollment is limited to Doctoral or Graduate level students.

Attributes: Doctoral, Graduate

PHT 720 Intro to Neuropsychopharmacology (3 credits)

This graduate level course will provide a working knowledge of the neurobiological and neurochemical basis of behavior and the mechanism by which drugs influence synaptic neurotransmission to alter behavior and function in neurologic and psychiatric disorders.

Restrictions: Enrollment is limited to Doctoral or Graduate level students.

Attributes: Doctoral, Graduate

PHT 721 Advanced Medicinal Chem/Pharm (4 credits)

This graduate level course will introduce concepts involved in drug actions in the body. Principles of medicinal chemistry, pharmacokinetics, pharmacodynamics and pharmacogenomics will be explored from a theoretical standpoint with integration of chemical and biological principles.

Restrictions: Enrollment is limited to Doctoral or Graduate level students.

Attributes: Doctoral, Graduate

PHT 740 Drug Disc Neurodegenerative (3 credits)

The goal of this graduate level course is to examine the drug discovery process with focus on neurodegenerative disorders. Using Alzheimer's disease for illustration, we will examine diagnosis, epidemiology, current therapeutics, strategies for drug discovery (amyloid hypothesis, tau, apo E, insulin, and various receptors) in vitro and in vivo disease models. We will examine the in vivo models to see how well they simulate the disease and thus how reliable they may be in translational studies. Although the focus of the course is on preclinical studies, we will examine how some of the compounds that have done well in preclinical studies have fared in clinical studies thus illustrating challenges in this field.

Restrictions: Enrollment is limited to Doctoral or Graduate level students.

Attributes: Doctoral, Graduate

PHT 750 Research Ethics and Conduct (1-3 credits)

This graduate level course discusses research ethics and conduct as it relates to Drug Discovery & Development and Cell Gene Therapy (CGT). There will be modules of different topics which will be self-paced and engaging through literature and web based searches, discussions, presentations and papers and real life examples that will be described throughout the semester. Discussions around ethics will include AI, data manipulation, gene editing, healthy donor cells storage and use in cell gene therapy, autologous cell therapy.

Restrictions: Enrollment limited to students in the PPBS, PPMS or PPPHD programs. Enrollment is limited to Doctoral or Graduate level students.

Attributes: Doctoral, Graduate

PHT 752 Intro Scientific Data Analysis (1 credit)

This graduate level course is designed to give an introduction to the important foundation of science related to data generation, validation and analysis and conduct in research. In this advanced course students will learn how to accurately analyze data. In this course we will discuss the source of errors and interpretation of statistical p-value, as well as dive into the statistical tests most commonly used in studies related to Drug Discovery & Development (DDD) and Cell Gene Therapy (CGT). We will also discuss the ethics in conducting research. This course can be taken as a "stand alone" course as well as in conjunction with the existing PHT750 courses to satisfy students who need 3-credit electives.

Restrictions: Enrollment limited to students in the PPBS, PPMS or PPPHD programs. Enrollment is limited to Doctoral or Graduate level students.

PHT 770 Special Topics in Pharmacology (4 credits)

This graduate level course will describe pharmacological classes of therapeutic agents with emphasis on mechanisms of actions at the cellular and organ levels. Students will also participate in interactive learning related to special topics in pharmacology.

Restrictions: Enrollment is limited to Doctoral or Graduate level students.

Attributes: Doctoral, Graduate

PHT 799 Master's Research (1-10 credits)

Candidates for the master of science degree complete an independent research project, equivalent to at least 10 research credits, under the direction of an Advisory Committee of graduate faculty.

Restrictions: Enrollment is limited to Doctoral or Graduate level students.

Attributes: Doctoral, Graduate

PHT 801 Research Lit in Pharm/Tox (1 credit)

Weekly presentations by graduate students and faculty on current research papers from journals relevant to the fields of pharmacology and toxicology, followed by group discussion. Attendance and active participation are required during fall and spring semesters.

Restrictions: Enrollment is limited to Doctoral or Graduate level students.

Attributes: Doctoral, Graduate

PHT 802 Advanced Pharmacology (3 credits)

This course will introduce concepts involved in drug actions in the body. Principles of medicinal chemistry, pharmacokinetics, pharmacodynamics and pharmacogenomics will be explored from a theoretical standpoint with integration of chemical and biological principles. This course engages students to think critically through medicinal chemistry concepts and designs including functional groups, isomerism, bonding, physicochemical properties, salts, and prodrugs while being able to delve into examples of structure activity relationships with regard to interactions between drugs and their targets. A large emphasis on interaction between a ligand and its target (receptors, signaling cascades, second messengers, enzymes, transporters, etc.) and methodology and experimental design at the preclinical level describing the processes and parameters that determine absorption, distribution, metabolism, and excretion/elimination (ADME) of chemicals will also be covered.

Attributes: Doctoral, Graduate

PHT 803 Advanced Toxicology (3 credits)

This course introduces the biochemical, genetic, cellular basis of cytotoxicity. Based on this knowledge, the course will study the toxic effects and their underlying mechanisms in different organ systems (e.g., liver, kidney, lung, eye, immunity, endocrine, and reproductive system).

Attributes: Doctoral, Graduate

PHT 804 Intro Drug Discovery and Dev (3 credits)

This course will allow students to gain insight into the process of drug discovery and development. By interacting with different experts in the field of drug discovery and development, students will learn about the steps to drug discovery including new target identification, selection and validation, screening of potential candidates, understanding the formulation process, packaging and delivery of new drugs and finally being exposed to the important regulatory aspects of the drug discovery process and how it applies to taking novel discoveries to clinic and patients. This course also introduces basic concepts of medicinal chemistry as applied to drug discovery.

Attributes: Graduate

PHT 807 Tox Subst Use Disorder (Appld) (3 credits)

Students will develop a working knowledge of the key neurotransmitters and mechanisms involved in substance use disorders. They will also explore the neurobiological and neurochemical theories proposed for different types of substance use disorders. Students will delve into the neurotoxicology of both the central and peripheral nervous systems, as well as gain insights into the principles of drug metabolism for substances with abuse potential. Lastly, they will examine the mechanisms through which substance use can modify behavior and mood, ultimately leading to the development of disease states.

Restrictions: Enrollment is limited to Doctoral level students.

Attributes: Doctoral, Graduate

PHT 811 Research Techniques Laboratory (1-3 credits)

"During the first year of enrollment, each student satisfactorily completes an experiential rotation through the research laboratories of at least two departmental graduate faculty and selects a primary research topic."

Restrictions: Enrollment is limited to Doctoral or Graduate level students.

PHT 821 Molecular Pharmacology (3 credits)

"This is an advanced pharmacology course with a focus on cell signal transduction. Major mammalian signaling pathways will be reviewed and how therapeutics, especially anticancer therapeutics, perturb these signaling pathways for therapeutic purposes will be discussed. Instructors will provide appropriate recent review and research papers to the class. Students are required to read these papers and actively participate in class discussion. Students are also required to write a mock research proposal and present it in class."

PHT 840 Drug Disc Neurodegenerative (3 credits)

The goal of this course is to examine the drug discovery process with focus on neurodegenerative disorders. Using Alzheimer's disease for illustration, we will examine diagnosis, epidemiology, current therapeutics, strategies for drug discovery (amyloid hypothesis, tau, apo E, insulin, and various receptors) in vitro and in vivo disease models. We will examine the in vivo models to see how well they simulate the disease and thus how reliable they may be in translational studies. Although the focus of the course is on preclinical studies, we will examine how some of the compounds that have done well in preclinical studies have fared in clinical studies thus illustrating challenges in this field.

Restrictions: Enrollment is limited to Doctoral level students.

Attributes: Doctoral

PHT 851 Drug Discovery & Development (3 credits)

This is an advanced 3-credit course of pharmacology & toxicology focusing on drug discovery and development. The primary objective of this course is to provide students with an in-depth knowledge about the major steps involved in drug discovery and development with real examples. The course will cover all major stages for advancing a molecule from the pre-clinical space into clinical FIH (First in Human) trials. These include target identification and validation, screening and selection of appropriate targeting molecules, non-clinical safety assessment, PK/PD modeling, clinical trial design, FIH dose calculation and efficacy assessment, et al. In addition to the didactic teaching, students will be assigned with a group project to use the knowledge they have learned to solve problems in drug discovery and development. After completing the course, students will have a deep understanding and practical knowledge of how pharmaceutical industry develops small molecule chemicals and biological macromolecules to become life-saving medicines.

Restrictions: Enrollment limited to students in the PPBS, PPMS or PPPHD programs.

PHT 880 Pharm Tox Seminar (1 credit)

"Reports on current research topics by guest scientists, departmental faculty, and graduate students, followed by group discussion. Attendance and participation are required during fall and spring semesters."

PHT 895 Independent Research Project (1-4 credits)

This graduate level course is a research opportunity (drug discovery & development) for post-bac and graduate students that have already acquired a BS degree to work with a faculty mentor (or faculty's lab team members) to gain insight and skills in research literature interpretation, hypothesis testing, laboratory measures, and data analysis, as well as research summarization and conclusion generation, with poster preparation and data presentation to a broad audience. This course can be taken multiple times.

Restrictions: Enrollment is limited to Doctoral or Graduate level students.

Attributes: Doctoral, Graduate

PHT 899 Doctoral Research (1-10 credits)

Candidates for the Doctor of Philosophy Degree, specializing in Pharmacology & Toxicology, and Pharmacuetics are required to fulfill 20 credits of independent research under the direction of a faculty member in the program.

Attributes: Doctoral