

PHSC 8601 Research

(3 credits / 54 semester hours)

Research is an ongoing process in which one is expected to stay on top of the relevant developments in the discipline. The principal objective of this course is to provide the student knowledge and skills in a variety of areas to strengthen personal, academic, and research competencies to succeed in the graduate program. Its investigational work developed by the student towards its dissertation. This is an independent study course for a student to develop and implement a research project with a faculty mentor.

PHSC 8602 Seminar

(1 credit / 18 semester hours)

Research is an ongoing process in which one is expected to stay on top of the relevant developments in the discipline. The principal objective of this course is to provide the student knowledge and skills in a variety of areas to strengthen personal, academic, and research competencies to succeed in the graduate program. The seminar introduces the student, through conferences, oral presentations, seminars, colloquiums, and forums, to a process of academic research and allows to have an open mind to problem-solving strategies based on formal inquiry and detailed research. Students are expected to engage in active questioning and discussion as part of the presentations.

PHSC 8517 Regulatory and Manufacturing Practices

(3 credits / 54 semester hours)

This course required by the PhD program will provide to the student the fundamentals behind the regulatory guidelines and regulations related to the quality of a pharmaceutical drug throughout its life cycle. Starting from the development of the drug, submission and clinical trials, manufacturing process development, commercial manufacture, up to its discontinuation. The student will learn through interactive lectures and class discussions the regulations and guidelines developed and/or embraced by the Food and Drug Administration, such as Code of Federal regulations (CFRs), FDA Frameworks and Guidelines, and the International Conference on Harmonization (ICH), and the European Medicines Agency (EMA) regulations.

PHSC 8436 Pharmaceutical Formulation and Drug Delivery

(3 credits / 54 semester hours)

This course focuses on the pharmaceutical formulation development (drug product) covering the theoretical aspects of different types of dosage forms and their delivery mechanisms. The course will follow a Quality by Design (QbD) approach to formulation development, highlighting key stages as (I) drug and excipient selection (preformulation design), (II) biopharmaceutical considerations and (III) physico-chemical considerations, and (IV) manufacturing considerations. For each stage important concepts and methods and their underlying theory is discussed. In addition, the course will include novel formulations and delivery systems.

PHSC 8437 Pharmacogenomics/Pharmacogenetics

(3 credits / 54 semester hours)

This course is aimed at covering the fundamentals of Pharmacogenomics in order to enhance the safety and benefits of a therapeutic intervention, as part of the personalized healthcare paradigm. Students will acquire relevant information for better understanding of the potential benefit and/or risk of a drug product in a particular population. This course pursues to bring together interplaying disciplines such as genetics, pharmacokinetics and therapeutics. The course will discuss concepts regarding pharmacogenomics, genetic polymorphism, population and individual variability and metabolic interactions. Both instructive and didactic lectures, case-study discussions, following participatory strategies of learning and informatic technology logistics, will be used. This course involves the therapeutic implications of population genetic differences in order to explain why some people respond well to a drug whereas others do not receive the expected benefit or develop undue adverse events.

PHSC 8131 Advanced Pharmacology I

(3 credits / 54 semester hours)

In this course, the students will be exposed to the advanced principles of pharmacology and the modern aspects of pharmacokinetics, pharmacodynamics and pharmacogenomics. In addition, students will be exposed to different drug classes, discussion will be divided by organ system and clinical conditions. Specifically, discussion will focus on the mechanism of action, therapeutic applications and adverse reactions; including toxicity and the appropriate treatments and major drug interactions. Emphasis will be given to the principles of absorption, distribution, metabolism and excretion (ADME). Knowledge of the basic and biomedical sciences will also be integrated. Active learning methodologies will be used in addition to lecture/discussion sessions.

PHSC 8132 Advanced Pharmacology II

(3 credits / 54 semester hours)

In this course, the students will be exposed to the advanced principles of pharmacology and the modern aspects of pharmacokinetics, pharmacodynamics and pharmacogenomics. In addition, students will be exposed to different drug classes, discussion will be divided by organ system and clinical conditions. Specifically, discussion will focus on the mechanism of action, therapeutic applications and adverse reactions; including toxicity and the appropriate treatments and major drug-drug interactions. Emphasis will be given to the principles of absorption, distribution, metabolism and excretion (ADME). Knowledge of the basic and biomedical sciences will also be integrated. Active learning methodologies will be used in addition to lecture/discussion sessions.

PHSC 8335 Ethics in Research

(2 credits / 36 semester hours)

Through lectures and group discussions this course presents and analyzes specific issues related to scientific integrity such as authorship and publication, scientific record keeping, data ownership and management, peer review and mentorship. Behaviors related to Research Misconduct will be analyzed in depth. This course also presents and analyzes specific issues related to intellectual property and the protection of human participants in scientific research. The course is intended to instruct students about ethical issues in research in order to accomplish ethical behavior throughout their career.

PHSC 8338 Business, Quality and Project Management

(3 credits / 54 semester hours)

The purpose of the course is to lay the foundation and principles for a solid understanding of business, quality and project management and introduces the concept of entrepreneurship to life in their profession. The course covers key competencies for planning and controlling projects, leading quality improvement initiatives and understanding interpersonal relationships that drive successful project outcomes. Focusing on the introduction of new products and processes, the course discusses the project management life cycle, defining project parameters, matrix management challenges, effective project management tools and techniques, and the role of a project manager. The principles of Lean Manufacturing will be an integral portion of the course. Students will develop knowledge and skills necessary to manage their teams, schedules, risks, and resources to produce a desired outcome.

PHSC 8425 Laboratory Rotation

(1 credit/ 18 hours)

In this laboratory experience the student will rotate through three different research facilities and will work on projects under the supervision of a faculty member. This hands-on experience will expose the student to different research topics within the pharmaceutical sciences area. In addition, the student will acquire introductory training in diverse laboratory techniques and will apply the concepts of experimental design in a real scenario. It is expected that at the end of this course the student will be able to choose a thesis project topic and a major advisor.

PHSC 8447 Principles of Drug Discovery and Drug Development

(3 credits/ 54 semester hours)

This course is designed to provide the student with an in depth understanding of how academic institutions, pharmaceutical and biotechnology companies discover, develop and characterize new drug candidates for clinical trials. The course will focus on the development of small molecule and biological drugs and will follow the discovery path through identification of a disease, selection of biological targets and identification of a potential candidate to the preclinical characterization of the drug necessary for the development.

PHSC 8236 Applied Biostatistics

(3 credits/ 54 semester hours) Pre-Requisite: Pre-calculus course or its equivalent

Basic concepts in Statistics are discussed including descriptive statistics, graphs, probability and inferential statistics. Several statistical methods for univariate and bivariate analysis are discussed in the context of pharmaceutical sciences and health.

PHSC 8516 Principles of Pharmaceutical Sciences

(3 credits / 54 semester hours)

This course includes introduction the fundamental principles of physical and chemical pharmacy and its application pharmaceutical dosage forms and drug delivery systems. The course also deals with the interaction with biological and physicochemical combinations related to drug effectiveness (dissolution and bioavailability) and dosage form design.

PHSC 8427 Pharmaceutical Engineering and Unit Operations

(3 credits / 54 semester hours)

Presents unit operations and engineering principles involved in the manufacture of pharmaceuticals, from the isolation and purification of active pharmaceutical ingredients (API) to the final production of drug products. Regulatory issues include quality by design (QbD) and process analytical technologies (PAT) of unit operations, such as distillation, extraction, crystallization, filtration, drying, milling, blending, granulation, and tableting.

PHSC 8127 Advanced Molecular Biochemistry

(3 credits / 54 semester hours)

This course focuses on the structure and function of biomolecules, including proteins, enzymes, nucleic acids, lipids, carbohydrates, vitamins, and hormones. It also deals with the transformations, interactions and energy changes of these biomolecules (metabolism) in the different cells of the organism and how these reactions are regulated. The origin of high-energy compounds is described in relation to mitochondrial function and their participation in energy requiring processes. In addition, the course will present the characteristics of the human genome, the replication and repair of the genetic material, the transcription and translation of genetic information, the alteration of genetic material (mutations), and its consequences (genetic diseases), and the modern methods and techniques of molecular biology (such as: recombinant DNA technology, gene therapy and cloning).

PHSC 8122 Advanced Medicinal Chemistry and Pharmacognosy I

(3 credits / 54 hours)

In this course the disciplines of medicinal chemistry and pharmacognosy are integrated to facilitate understanding of the relationship between the physical and chemical properties of a drug and pharmacological effect, action in the living organism, the isolation and structural determination of compounds with pharmaceutical, medicinal and biological activities derived from plants. In addition, knowledge of basic and biomedical sciences is integrated. It will be incorporated to the lecture/discussion, active learning methodologies.

PHSC 8123 Advanced Medicinal Chemistry and Pharmacognosy II

(3 credits / 54 hours)

In this course of the second graduate year will continue with the development and study of drug concept from synthetic drugs or medicinal plants. Disciplines of medicinal chemistry and Pharmacognosy are integrated to facilitate understanding of the relationship between the physical and chemical properties of a drug and pharmacological effect, action in the living organism, the isolation and structural determination of compounds with pharmaceutical, medicinal and biological activities derived from plants. In addition, knowledge of basic and biomedical sciences is integrated. It will be incorporated to the lecture/discussion, active learning methodologies.

PHSC 8237 Advanced Methods and Synthetic Organic Chemistry

(3 credits / 54 hours)

This advanced course in organic synthetic methods is designed for students in their second year of Ph.D. in Pharmaceutical Sciences. The main goal of this course is to provide students with a stimulating learning experience and modern studies on aspects of organic chemistry. This course will provide students with an advanced knowledge in theory, concepts and methodologies related to organic synthesis, and a methodical construction of organic molecules. The course will cover topics from stereochemical and conformational analysis, formation of carbon-carbon bonds, oxidation and reduction of functional groups, organometallic reactions, and total synthesis of complex molecules. After completing this course, students should be prepared to implement these concepts in medicinal chemistry and natural products research with high relevance in the design and synthesis of organic molecules whose properties and characteristics are of interest in medicinal applications.

PHSC 8116 Advanced Instrumental Analysis

(3 credits / 54 semester hours)

In this problem-based course the practical and theoretical principles of analytical techniques utilized in the qualitative and quantitative analysis of drugs, metabolites, excipients, and endogenous substances in biological fluids and other matrixes will be discussed. The student will acquire the knowledge of the different techniques that will be used to analyze compounds in complex matrices; for example, drug development, biological fluids, tissue, environmental samples, and others. The student will be exposed to various situations in which he/she can use their own judgment to select the most appropriate technique to be used according to the situation. In addition, the principles and concepts of analytical method validation for the instrumental techniques will be discussed.

PHSC 8016 Advanced Biopharmaceutics and Pharmacokinetics

(3 credits / 54 semester hours)

This course expands the basis of the Biopharmaceutics and Pharmacokinetic principles and procedures in order to reinforce and enhance the knowledge on critical concepts such as drug product, bioavailability, dosing regimens, ADME and their applications in clinical settings. The students will acquire relevant information for better understanding of the potential benefit related to the safety and effective use of drug product. It is aimed at enhancing the students' skills in developing and accessing formulations based on the relationship between the drug, drug delivery system, dosing regimen and the living system. It brings together disciplines like pharmacokinetics, biopharmaceutics, physical pharmacy, compounding, and therapeutics. It strengthens concepts related to the optimization of drug products by identifying factors determining untoward responses and poor bioavailability. Active learning strategies and methodologies will be used, as well as lectures and case discussions.

PHSC 8600 Principles in Research Design

(2 credits / 36 hours)

In this course the students will be exposed to the skills necessary for writing a successful research proposal including basic concepts, statement of problem, hypothesis, objectives, design of experiments, experiment planning, analysis of the data and documentation of results. At the end of the course the students will be required to submit an original completed research proposal.