

# PHARMACY—MEDICINAL CHEMISTRY

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## PHA 6354 Natural Medicinal Products 3 Credits

**Grading Scheme:** Letter Grade

Chemistry of compounds derived from plants and animals.

## PHA 6356 Structure Determination of Complex Natural Products 3 Credits

**Grading Scheme:** Letter Grade

Rigorous structure determination of natural products, using modern spectroscopic methods. Become able to elucidate the structure of any organic small molecule.

**Prerequisite:** CHM 5235 or consent of instructor.

## PHA 6357 Herbal & Dietary Supplements 3 Credits

**Grading Scheme:** Letter Grade

Herbal Dietary supplements are extensively used by consumers. This course provides an overview of commonly used supplements to assist healthcare practitioners in providing patients with adequate counseling to avoid drug interactions and false claims.

## PHA 6416 Pharmaceutical Analysis I 3 Credits

**Grading Scheme:** Letter Grade

Theory and applications of relevant analytical techniques for analysis of drugs in biological samples. Offered spring term in odd-numbered years.

## PHA 6417 Pharmaceutical Analysis II 3 Credits

**Grading Scheme:** Letter Grade

Absorption, fluorescence, phosphorescence, and spectroanalysis of drugs and related compounds.

## PHA 6425 Drug Biotrans and Molecular Mechanisms of Toxicity 3 Credits

**Grading Scheme:** Letter Grade

Enzymology and mechanisms of drug biotransformation pathways. Examples of drugs and other xenobiotics that exhibit toxicity related to biotransformation.

**Prerequisite:** introductory organic chemistry, biochemistry.

## PHA 6432 Fundamentals of Pharmaceutical Chemistry 1 Credit

**Grading Scheme:** Letter Grade

This is a foundation course whose aims are providing an introduction to the principles of Pharmaceutical chemistry, including an understanding of drug structure-activity relationships, prediction of the physico-chemical properties of a drug, basic knowledge of the major pathways of drug metabolism, and factors that can contribute to drug-drug interactions.

## PHA 6435 Biosynthetic Logic of Medicinal Natural Products 3 Credits

**Grading Scheme:** Letter Grade

Covers topics of biosynthesis of the major families of medical natural products, structural and biochemical understanding of their biosynthetic logic, gene cluster identification, genome mining, and production of bioactive "unnatural products" for drug discovery and development.

**Prerequisite:** Students are expected to have the background of Biochemistry, Enzymology, and Bioorganic Chemistry. Or permission of instructors.

## PHA 6444 Pharmaceutical Chemistry I 3 Credits

**Grading Scheme:** Letter Grade

Students are shown how to predict the solubilities, structure-activity relationships, basic synthesis routes for selected structures, metabolism and pharmacological activity/potency of various drug classes. In particular, anticoagulants, ACE inhibitors, glucocorticoid steroids, nitrate esters, adrenergics, cholinergics, diuretics, anesthetics, antihyperlipidemics, muscle relaxants, anxiolytics, antidepressants, sedative hypnotics and vitamins are covered.

## PHA 6447 Drug Design 3 Credits

**Grading Scheme:** Letter Grade

Relevant disciplines and their effect on new drug development, from discovery of a new active lead compound to final refinement as a commercial product.

**Prerequisite:** organic chemistry, biochemistry, pharmacology, or consent of instructor.

## PHA 6452 Metabolic Biochemistry 3 Credits

**Grading Scheme:** Letter Grade

This course will introduce students to the principles of anabolic and catabolic pathways and cellular energy efficiency. The course also provides an understanding of the biological, physical, and chemical processes for each reaction pathway.

## PHA 6467C Drug Design II 3 Credits

**Grading Scheme:** Letter Grade

Outline of how relevant disciplines impact on the development of a new drug product from the discovery of a new active lead compound to its final refinement as a commercial product. Contributions of Organic Chemistry, Biochemistry, Metabolic Chemistry, Physical Chemistry, Analytical Chemistry, and Pharmacological Chemistry are discussed.

**Prerequisite:** PHA 6447 Drug Design I.

## PHA 6468 Biotransformation Considerations in Drug Design 2 Credits

**Grading Scheme:** Letter Grade

Explores the importance of considering biotransformation in the process of drug design and discovery. Topics include the major pathways of biotransformation of various functional groups present in drugs and the enzymes involved, including their regulation and factors affecting metabolism and enzyme activity. Other topics are the role of metabolism in drug toxicity and examples from the literature of metabolic activation of drugs and naturally occurring toxic chemicals.

**Prerequisite:** PHA 6447 and PHA 6467C and an additional undergraduate chemistry or biochemistry class with permission of instructor..

## PHA 6471 Synthetic Medicinal Chemistry 3 Credits

**Grading Scheme:** Letter Grade

Review of acid and base properties of pharmacologically active molecules. Review of mechanisms of synthetic reactions, and their applications.

## PHA 6472 Organic Synthesis of Drug Molecules 3 Credits

**Grading Scheme:** Letter Grade

Covers advanced topics in drug molecule synthesis, including: organic reaction mechanisms, retrosynthetic analysis, asymmetric synthesis, heterocyclic chemistry, natural product synthesis, drug design and synthesis, structure-activity relationships. Secondary topics that will be included in this course include: anticancer/antibacterial agents, screening approaches.

**Prerequisite:** CHM 5224 or permission of instructor.

**PHA 6532 Occupational Toxicology 3 Credits****Grading Scheme:** Letter Grade

Focuses on the growing field of occupational toxicology, the specific toxicants encountered in various work environments, and how both acute and chronic exposure can impact health. Symptom presentation, differential diagnosis, and treatment are covered as well as preventive measures that can be implemented to reduce or prevent such exposures.

**PHA 6533 Epidemiology & Biostatistics in Clinical Toxicology 3 Credits****Grading Scheme:** Letter Grade

Covers principles and applications of epidemiology and biostatistics as they apply to clinical toxicology. Students will learn to critically evaluate and understand data analyses and results presented in the medical literature. Upon completion of this course, students will have the basic knowledge of epidemiological analysis and biostatistical techniques to aid in the interpretation and treatment of the poisoned or overdosed patient.

**PHA 6534 Toxicology of Chemical Weapons 3 Credits****Grading Scheme:** Letter Grade

Providing healthcare providers, first responders, and others that may be exposed to chemical weapons with an understanding of their toxicology and treatment approaches.

**PHA 6535 Principles of Nucleotide Activity 2 Credits****Grading Scheme:** Letter Grade

This course will be introducing the students to the chemical structure of DNA and RNA; the synthetic processes for DNA and RNA synthesis; biochemical reactions and pathways for nucleotide synthesis; DNA replication, transcription and translation; covalent and reversible interactions of nucleic acids with small molecules and proteins and an overview of techniques for the analysis of nucleic acids.

**PHA 6543 Pharmaceutical Chemistry II 3 Credits****Grading Scheme:** Letter Grade

Showing students how to predict the solubilities, structure-activity relationships, basic synthesis routes for selected structures, metabolism and pharmacological activity/potency of various drug classes. In particular antidiabetics, anticonvulsants, H1 and H2 antagonists, analgetics, nonsteroidal antiinflammatory drugs, hormones, antibiotics, antiviral agents, and antineoplastic agents are covered.

**PHA 6556 Introduction to Clinical Toxicology 3 Credits****Grading Scheme:** Letter Grade

Introducing the basic methods and procedures commonly employed in Clinical Toxicology as well as the concept of Clinical Toxicology as an interdisciplinary science within the field of healthcare.

**PHA 6557 Clinical Toxicology 1 3 Credits****Grading Scheme:** Letter Grade

Providing students with an understanding of the toxic effects and clinical applications of various therapeutic drug classes including cardiovascular, CNS, analgetic, anesthetic, antineoplastic, and antibiotic drugs.

**Prerequisite:** VME 6602**PHA 6840 Medicinal Chemistry of Drugs of Abuse 3 Credits****Grading Scheme:** Letter Grade

Pharmacological effects of commonly encountered licit and illicit pharmaceutical compounds.

**PHA 6850 Principles of Forensic Science 3 Credits****Grading Scheme:** Letter Grade

Introducing the basic disciplines of forensic science. The course is composed of twelve modules.

**PHA 6851 Forensic Analysis of DNA 3 Credits****Grading Scheme:** Letter Grade

Techniques for isolation of DNA from cells. Spectroscopic techniques. Hydrodynamic and electrophoretic separation methods. Sequence determination. Statistical analysis and forensic significance.

**PHA 6852 Mammalian Molecular Biology 3 Credits****Grading Scheme:** Letter Grade

Focus on the principles of modern molecular biology and biochemistry and expand on the concepts you may have already encountered in other classes in this program. The content will also include the applications of experimental techniques and procedures routinely used in this field.

**PHA 6853 Biological Evidence and Serology 3 Credits****Grading Scheme:** Letter Grade

Overview of crime scene investigation as it pertains to biological evidence. Crime scene safety. Collecting and preserving evidence. Identifying, analyzing, and interpreting biological stains.

**PHA 6854 Forensic Immunology 3 Credits****Grading Scheme:** Letter Grade

Antibody formation, antigen structure. Complement mediated reactions. Hypersensitivity. Immuno-electrophoretic techniques in forensic science.

**PHA 6855 Forensic Genetics 3 Credits****Grading Scheme:** Letter Grade

Principles of inheritance. Genetic polymorphisms and forensic implications, population genetics and paternity testing.

**PHA 6856 Bloodstain Pattern Analysis 3 Credits****Grading Scheme:** Letter Grade

Blood spatter creation and interpretation. Recording, collection, and processing of bloodstains and blood spatter evidence.

**PHA 6857 Forensic Analysis of DNA 2 3 Credits****Grading Scheme:** Letter Grade

This course covers how to interpret DNA data to include mixture deconvolution and the statistics that apply to DNA matches/inclusions. Modules guide the student through the basis of Y-STR and Kinship testing statistical applications. Students will learn the report writing, review and testimony skills required of a DNA analyst.

**Prerequisite:** PHA6851 - Forensic Analysis of DNA**PHA 6861 Intro to Forensic Medicine 2 4 Credits****Grading Scheme:** Letter Grade

Forensic medicine is the application of medical knowledge to the investigation of crime. This course gives knowledge and understanding of the application of scientific knowledge to medico-legal problems and legal proceedings, specifically as related to investigating medical crimes as well as the causes of sudden and unexpected deaths.

**Prerequisite:** VME 6582.**PHA 6905C Research Procedures in Pharmaceutical Sciences 1-4 Credits****Grading Scheme:** Letter Grade

Research Procedures in Medicinal Chemistry

**PHA 6910 Supervised Research 1-5 Credits, Max 5 Credits****Grading Scheme:** S/U

Supervised Research

**PHA 6934 Seminar in Medicinal Chemistry 1 Credit, Max 3 Credits****Grading Scheme:** Letter Grade

Weekly presentation and discussion of research reports based on college programs or literature.

**PHA 6935 Selected Topics in Pharmacy 1-4 Credits, Max 12 Credits****Grading Scheme:** Letter Grade

Open to all departments in the College of Pharmacy.

**PHA 6936 Advanced Topics in Pharmaceutical Sciences 1-2 Credits, Max 4 Credits****Grading Scheme:** Letter Grade

Written and oral presentation of research designs, protocols, papers, and critical appraisals with discussion and critical review of such topics.

**PHA 6938 Research Seminar 1 Credit, Max 3 Credits****Grading Scheme:** Letter Grade

Seminar required of graduate students in the College of Pharmacy.

**PHA 6940 Supervised Teaching 1-5 Credits, Max 5 Credits****Grading Scheme:** S/U

Supervised Teaching

**PHA 6971 Research for Master's Thesis 1-15 Credits****Grading Scheme:** S/U

Research for Master's Thesis

**PHA 7979 Advanced Research 1-12 Credits****Grading Scheme:** S/U

Research for doctoral students before admission to candidacy. Designed for students with a master's degree in the field of study or for students who have been accepted for a doctoral program. Not appropriate for students who have been admitted to candidacy.

**PHA 7980 Research for Doctoral Dissertation 1-15 Credits****Grading Scheme:** S/U

Research for Doctoral Dissertation