PHARMACOLOGY AND TOXICOLOGY

Department of Pharmacology and Toxicology
College of Veterinary Medicine

211 Pharmacology and Toxicology in Society
Spring, 2(2-0)

321 Common Drugs
Spring, 3(3-0) P: (PSL 250) or (PSL 431 and PSL 432) or PSL 310 R: Open to juniors or seniors or approval of department.
Introduction to commonly used drugs. Emphasis on over-the-counter medications and frequently prescribed prescription drugs. Selected natural products also will be covered. How commonly used drugs affect the body to treat or cure various conditions and how the body handles drugs. Principles of appropriate drug use and consequences of misuse.

350 Introductory Human Pharmacology
Fall, Spring, Summer. 3(3-0) P: (PSL 250 or PSL 310) or (PSL 431 and PSL 432) R: Not open to freshmen. Not open to students with credit in PHM 430 or PHM 440.
General principles of pharmacology. Central nervous system, autonomic nervous system, cardiovascular, renal, cancer, microbial, and endocrine pharmacology.

422 Fundamentals of Neuropharmacology
Spring, 2(2-0) Interdepartmental with Neuroscience. Administered by Pharmacology and Toxicology. P: NEU 301 or PSL 250 or PSL 310 or PSL 431 R: Open to juniors or seniors or approval of department.
Mechanisms and uses of action of drugs on neurons and neuron-controlled activities

430 Human Pharmacology
Summer. 3 credits. P: (PSL 250 or PSL 310) or (PSL 431 and PSL 432) RB: Molecular biology, biochemistry, chemistry, physiology, and/or human biology. R: Open to master's students in the Integrative Pharmacology Major or in the Pharmacology and Toxicology Major and open to undergraduate students.
Approval of department. Not open to students with credit in PHM 350 or PHM 440.
General principles of pharmacology. Central nervous system and autonomic nervous system, cardiovascular, renal, cancer, microbial, and endocrine pharmacology.

431 Pharmacology of Drug Addiction
Fall. 3(3-0) Interdepartmental with Neuroscience. Administered by Pharmacology and Toxicology. RB: Zoology or Human Biology or Psychology or Biochemistry or Physiology.
Introduction to pharmacology and neuropharmacology. Understanding of the biological basis for drug abuse and addiction.

440 Principles of Drug Action
Summer. 1 credit. RB: Chemistry, molecular biology, biochemistry, physiology, and/or human biology. R: Not open to master's students in the Integrative Pharmacology Major or in the Pharmacology and Toxicology Major. Not open to students with credit in PHM 430 or PHM 350.

450 Introduction to Chemical Toxicology
Fall, Spring, Summer. 3(3-0) P: (BS 161 and BS 162) or (LB 144 and LB 145) or (BS 181H and BS 182H) R: Open to juniors or seniors or approval of department.
How and why drugs are tested and monitored for safety. The roles of the FDA, USDA, and EPA to ensure drug safety.

461 Tropical Medicine Pharmacology
Fall, Spring. 2(2-0) P: PHM 350 or concurrently R: Open to juniors or seniors or master's students. Approval of department.
Tropical diseases, epidemiologic and clinical features, and pharmacologic treatments. Multidisciplinary and interdisciplinary approaches, especially in poverty settings.

480 Special Problems
Fall, Spring, Summer. 1 to 3 credits.
A student may earn a maximum of 9 credits in all enrollments for this course. R: Approval of department.
Individual work on selected research problems.

481L Independent Laboratory Research
Fall, Spring, Summer. 1 to 3 credits.
A student may earn a maximum of 6 credits in all enrollments for this course. RB: Human Biology, Neuroscience, Physiology, Biochemistry, Microbiology, Chemistry, Integrative Biology R: Approval of department.
Research experience in laboratories of and under supervision of faculty in Department of Pharmacology and Toxicology.

483 Chemotherapy of Infectious Diseases
Fall, Spring. 3(3-0) P: (PHM 350 or concurrently) and (PHM 461 or concurrently) RB: Biology, microbiology, or biochemistry. R: Approval of department.
Major human bacterial, viral, and fungal infections including disease characteristic, epidemiologic and clinical features, pathology, laboratory diagnosis, case reviews, and pharmacologic treatment including drug kinetics, dynamics, drug interactions and patient considerations.
PHM—Pharmacology and Toxicology

557 Veterinary Toxicology
Fall. 2(2-0) RB: Completion of Year 1 of the graduate-professional program in the College of Veterinary Medicine. R: Open to graduate-professional students in the College of Veterinary Medicine. Determinants of toxic responses, analytical toxicology, genetic toxicology, and toxic management. Diagnosis, prevention, and treatment of common toxicoses.

563 Medical Pharmacology
Summer. 3(3-0) A student may earn a maximum of 6 credits in all enrollments for this course. R: Open to graduate-professional students in the College of Human Medicine. General principles of pharmacology and toxicology and selected drugs. Rational drug therapy.

564 Basic Principles of Medical Pharmacology
Fall. 2(2-0) R: Open to graduate-professional students in the College of Osteopathic Medicine. Basic principles of pharmacology and toxicology and selected drugs.

590 Case Studies in Clinical Pharmacology
Spring. 2(2-0) P: PHM 563 RB: Completion of Year 2 in the College of Osteopathic Medicine or College of Human Medicine. R: Open to graduate-professional students in the College of Osteopathic Medicine or in the College of Human Medicine or approval of department. Selected case studies emphasizing clinical applications of pharmaceutical principles. Evaluation of new drugs, drug advertising, and adverse drug reactions.

658 Research Problems in Pharmacology or Toxicology
Fall. Spring. 1 to 3 credits. A student may earn a maximum of 6 credits in all enrollments for this course. RB: Completion of Semester 4 of the graduate-professional program in the College of Veterinary Medicine. R: Approval of department. Selected research problems in pharmacology or toxicology.

803 Chemical Disposition in Mammals
Fall. 1(1-0) R: Open to doctoral students. Approval of department. Not open to students with credit in PHM 801 or PHM 819. Principles of drug/toxicant absorption, distribution, metabolism, elimination, and kinetics in mammalian systems.

804 Molecular and Developmental Neurobiology
Fall. 3(3-0) Interdepartmental with Integrative Biology and Neuroscience and Pathobiology and Diagnostic Investigation and Psychology. Administered by Neuroscience. RB: Bachelor’s degree in a Biological Science or Psychology. R: Open to graduate students in Neuroscience major. Nervous system specific gene transcription and translation. Maturation, degeneration, plasticity, and repair in the nervous system.

805 Receptor Pharmacology
Fall. 1(1-0) R: Not open to doctoral students in the Department of Pharmacology and Toxicology. Approval of department. Fundamental principles and current theories of receptor pharmacology, drug receptor pharmacodynamics and signal transduction mechanisms.

808 Drug Discover and Medicinal Chemistry
Spring of even years. 2(2-0) Interdepartmental with Chemistry. Administered by Pharmacology and Toxicology. RB: BS in Biomedical science discipline (including, but not limited to chemistry, biochemistry, pharmacology, chemical engineering, molecular biology, biology, pharmacy, human biology, physiology.) R: Open to doctoral students in the Department of Chemistry or in the Department of Pharmacology and Toxicology or approval of department. Fundamentals of pharmaceutical drug discovery including basic chemistry, drug-design principles, high throughput screening, computational modeling, and drug metabolic pathways.

811 Global Health: Pharmacology and Toxicology Perspective
Summer. 2(2-0) P: PHM 350 or concurrently or approval of department RB: biology and/or pathology and/or toxicology R: Approval of department. General concepts of global health that are relevant to pharmacology and toxicology.

813 Cardiovascular Pharmacology and Toxicology
Summer. 3(3-0) R: Open to graduate students or approval of department. Cardiovascular signal transduction and control in normal and pathophysiologic states.

816 Integrative Toxicology: Mechanisms, Pathology and Regulation
Fall of odd years. 3(3-0) Interdepartmental with Animal Science and Biochemistry and Molecular Biology and Pathobiology and Diagnostic Investigation. Administered by Pharmacology and Toxicology. Biochemical, molecular, and physiological mechanisms of toxicity. Functional and pathological responses of major organ systems to chemical insult. Mechanisms of mutagenesis, carcinogenesis, and reproductive toxicity. Concepts in risk and safety assessment.

817 Neurotoxicology
Spring. 2(2-0) RB: PHM 819 and PHM 450 or equivalent introductory pharmacology and toxicology courses; undergraduate biochemistry and cell biology R: Open to graduate students. Approval of department. Biochemical, molecular, physiological mechanisms and assessment of neurotoxicity. Factors predisposing the nervous system to selective toxicants. Pathophysiology and models of toxicant-induced neurodegenerative diseases.

818 Practical Pharmacokinetics/Pharmacodynamics Modeling and Simulation in Drug Development
Fall. 1(1-0) P: PHM 819 or approval of department R: Open to graduate students in the Integrative Pharmacology Major or in the Pharmacology and Toxicology Major or approval of department. Modeling of pharmacokinetics and pharmacodynamics using published graphic use interfaces to solve models pertinent to pharmacology and toxicology.

819 Principles of Drug-Tissue Interactions
Fall, Summer. 2(2-0) R: Open to graduate students in the Integrative Pharmacology Major or in the Pharmacology and Toxicology Major. Approval of department. Not open to students with credit in PHM 801. General principles of interaction of chemicals with biological systems.

822 Academic and Research Integrity
Fall, Spring. Summer. 1(1-0) Guidelines for research and academic integrity focusing on issues pertinent to biomedical graduate students and scientists.

823 Current Topics in Pharmacology and Toxicology
Fall. 1(1-0) P: PHM 819 R: Open to graduate students in the Department of Pharmacology and Toxicology or in the Integrative Pharmacology Major or in the Pharmacology and Toxicology Major. Approval of department. Exploration of pharmacology and toxicology topics that have gathered recent attention either in scientific or popular arenas.
Mechanisms of action of drugs on the central nervous system. Carcinogenic potential of chemicals.

828 Concepts in Carcinogenesis
Fall. 2 credits. P: (BLD 830 or BMB 801 or approval of department) and (PHM 819 or approval of department) RB: (BMB 801 or BLD 830) and PHM 819 R: Open to master’s students or doctoral students or lifelong graduate students. Approval of department.

Mechanisms underlying malignant transformation of a cell. Carcinogenic potential of chemicals.

829 Neuropharmacology
Fall. 2(2-0) P: PHM 819 RB: Some background in physiology. R: Open to master’s students or doctoral students or lifelong graduate students.

Mechanisms of action of drugs on the central nervous system, targets, clinical use and side effects.

830 Experimental Design and Data Analysis
Fall, Summer. 3(3-0) RB: Undergraduate degree in biology, chemistry or related field.

Practical application of statistical principles to the design of experiments and analysis of experimental data in pharmacology, toxicology, and related biomedical sciences.

831 Endocrine Pharmacology and Toxicology
Spring. 2(2-0) P: PHM 819

Physiology, pharmacology, and toxicology of the endocrine system. Endocrine diseases, pharmacological intervention, hormone therapy, endocrine disruptors, role of hormones in normal metabolism and metabolic disorders, and animal models of endocrine and metabolic disorders.

832 Applied Integrative Pharmacology Laboratory
Summer. 3(3-0) P: (PHM 813 or concurrently) and PHM 819 and PHM 830 RB: Undergraduate degree in biology, chemistry or related field. Prior biomedical lab experience helpful. R: Not open to undergraduate students. Approval of department.

Research methods using virtual simulation for studying integrative physiology and pharmacology.

833 Gastro-Intestinal and Liver Pharmacology and Toxicology
Spring. 2(2-0) RB: (PHM 350 or PHM 819) or Some pharmacology background.

Specific drugs and their mechanisms of action in the treatment of gastrointestinal and liver diseases. Toxic effects of drugs and other xenobiotics on the gastrointestinal tract, including the liver.

834 Respiratory Pharmacology and Toxicology
Spring. 2(2-0) P: PHM 819 or approval of department RB: (PHM 819) and Some prior course work in physiology or pharmacology. R: Open to graduate students in the Department of Pharmacology and Toxicology or in the Integrative Pharmacology Major or in the Pharmacology and Toxicology Major in the Safety Pharmacology Certificate.

Integrative study of drugs, their mechanism of action, and their side effects in the treatment of major diseases and pathologies and toxicities of the respiratory system.

835 Biopharmaceuticals: From Development to Manufacturing
Fall. 3(3-0) P: PHM 819 RB: Undergraduate degree in biology, chemistry, or related field is recommended. R: Not open to undergraduate students.

Biopharmaceutical development and manufacturing processes for recombinant proteins, monoclonal antibodies, vaccines and cell-based therapeutics (stem cells). Emphasis on real-world case studies and group projects.

837 Autonomic Pharmacology
Spring. 1 credit. P: PHM 819

Effects of drugs having therapeutic potential and potential for adverse side effects within the autonomic nervous system and organs controlled by this system. Comparison with drugs having therapeutic potential and potential adverse side effects on muscle function.

838 Pharmacogenomics
Fall. 2(2-0) P: PHM 819 RB: Knowledge of general principles of pharmacology, physiology, and genetics. R: Open to graduate students in the Integrative Pharmacology Major or in the Pharmacology and Toxicology Major. Approval of department.

Dissection of the basics of genomics and its interaction with traits, efficacy, toxicity, kinetics and dosage involving drugs and drug pathways.

839 Systems Neuroscience
Spring. 4(4-0) Interdepartmental with Human Anatomy and Integrative Biology and Neuroscience and Psychology and Physiology. Administered by Neuroscience. R: Open to graduate students or human medicine students or osteopathic medicine students in the College of Natural Science or in the College of Agriculture and Natural Resources or in the College of Human Medicine or in the College of Osteopathic Medicine or in the College of Social Science or in the College of Veterinary Medicine. SA: ANT 839

Anatomy, pharmacology, and physiology of multicellular neural systems. Sensory, motor, autonomic, and chemo-regulatory systems in vertebrate brains.

840 Safety Pharmacology
Spring. 2(2-0) RB: Undergraduate degree in biology, chemistry or related area. Prior coursework in physiology useful.

Systems study of current experimental models, risk assessment, and regulatory guidelines for evaluating drug candidates for pharmacologic effects unrelated to therapeutic effects.

841 Cellular and Molecular Toxicology
Fall. 3(3-0) RB: PHM 819 and PHM 450 or equivalent introductory pharmacology and toxicology courses; undergraduate biochemistry and cell biology. R: Open to graduate students or approval of department.

Mechanistic concepts and techniques of toxicity at the cellular and molecular levels. Various molecular events and cellular modifications that result from and/or are associated with chemically/environmentally induced toxicity and disease.
Master's Thesis Research
Fall, Spring, Summer. 1 to 8 credits. A student may earn a maximum of 12 credits in all enrollments for this course. R: Open only to graduate students in the Department of Pharmacology and Toxicology. Approval of department. Master's thesis research.

Seminar
Fall, Spring. 1(1-0) A student may earn a maximum of 3 credits in all enrollments for this course. R: Open only to graduate students. Approval of department. Discussion of recent topics in pharmacology and toxicology by faculty or invited outside speakers. Students research reports.

Problems
Fall, Spring, Summer. 1 to 5 credits. A student may earn a maximum of 20 credits in all enrollments for this course. R: Open to doctoral students. Approval of department. Limited work in selected research projects.

Master of Science Capstone
Literature Review
Fall, Spring, Summer. 1 to 2 credits. A student may earn a maximum of 2 credits in all enrollments for this course. P: PHM 850 RB: Completion of at least 24 credits of MS program R: Open to master's students in the Integrative Pharmacology Major or in the Pharmacology and Toxicology Major. Approval of department. Advisor-supervised literature research and writing of a 15-20 page fully-referenced critical review paper on a relevant topic in pharmacology and toxicology.

Doctoral Dissertation Research
Fall, Spring, Summer. 1 to 24 credits. A student may earn a maximum of 36 credits in all enrollments for this course. R: Open to doctoral students in the Department of Pharmacology and Toxicology or in the Pharmacology and Toxicology-Environmental Toxicology major. Approval of department. Doctoral dissertation research.