Introduction to Chemical Toxicology
Determinants of toxic responses, analytical toxicology. Systems.

Veterinary Toxicology
Introduction to pharmacology and neuroparmacology. Understanding of the biological basis for drug abuse and addiction.

Introduction to Chemical Toxicology
Drug absorption, disposition, biotransformation, excretion, pharmacokinetics. Pharmacologic agents of the autonomic nervous, cardiovascular, renal, central nervous, endocrine, and gastrointestinal systems.

Veterinary Pharmacology
Drug absorption, disposition, biotransformation, excretion, pharmacokinetics. Pharmacologic agents of the autonomic nervous, cardiovascular, renal, central nervous, endocrine, and gastrointestinal systems.

Veterinary Toxicology
Determinants of toxic responses, analytical toxicology, genetic toxicology, and toxin management. Diagnosis, prevention, and treatment of common toxicoses.

Medical Pharmacology
General principles of pharmacology and selected drugs. Rational drug therapy.

Case Studies in Clinical Pharmacology
Description of targets in the mammalian central nervous system of clinically useful drugs and the influence of drugs.

Research Problems in Pharmacology or Toxicology
Selected research problems in pharmacology or toxicology.

Molecular and Developmental Neurobiology
Nervous system specific gene transcription and translation. Maturation, degeneration, plasticity, and repair in the nervous system.

Advanced Neuroscience Techniques Laboratory
Methods and underlying principles of neuroscience research.

Synaptic Transmission
Spring of odd years. 3(3-0) R: Approval of department. Chemical and electrical aspects of nerve impulse transmission at synaptic and neurotransmitter junctions. Influence of drugs.

Cardiovascular Pharmacology
Spring of even years. 3(3-0) R: Approval of department. Cardiovascular signal transduction and control in normal and pathophysiologic states.

Advanced Principles of Toxicology
Fall of odd years. 3(3-0) R: Approval of department. Biochemical, molecular and physiological mechanisms of toxicity. Responses of major organ systems to chemical insult. Mechanisms of mutagenesis, carcinogenesis, and reproductive toxicity. Concepts in risk and safety assessment.

Principles of Drug-Tissue Interactions
General principles relevant to the interaction of chemicals with biological systems. Topics include pharmacokinetics and/or pharmacodynamics.

Cellular, Molecular and Integrated Systems Pharmacology and Toxicology
Comprehensive overview of the cellular and molecular mechanisms of drug and chemical actions on the major organ systems of humans and other mammals.

Physiology and Pharmacology of Excitable Cells
Function of neurons and muscle at the cellular level: membrane biophysics and potentials, synaptic transmission, sensory nervous system function.

Neuropharmacology
Description of targets in the mammalian central nervous system of clinically useful drugs and the mechanism of action, clinical use, and side effects of those drugs.

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

Endocrine Pharmacology
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.
PHARMACOLOGY AND TOXICOLOGY—PHM

839 Systems Neuroscience  
Spring. 4(4-0) Interdepartmental with Human Anatomy and Neuroscience and Physiology and Psychology and Zoology. Administered by Neuroscience. R: Open only to graduate students in the Colleges of Human Medicine, Osteopathic Medicine, Agriculture and Natural Resources, Natural Science, Social Science, and Veterinary Medicine. SA: ANT 839
Anatomy, pharmacology, and physiology of multicellular neural systems. Sensory, motor, autonomic, and chemo-regulatory systems in vertebrate brains.

851 Intellectual Property and Patent Law for Biomedical Sciences  
Fall. 2(2-0) RB: Strong reading and writing skills helpful.
Fundamentals of intellectual property and patent law encountered by biomedical scientists, including issues of prevention, patent prosecution, and enforcement of patents in a litigation setting.

854 Leadership and Team-Building for Biomedical Research  
Fall. 2(2-0) RB: Experience supervising others and/or participation in workplace teams is strongly suggested. Not open to students with credit in CMBA 804 or CMBA 805 or CMBA 806 or CMBA 832.
Evaluation of current leadership methods. Models of leadership. Practice of specific skills and development of a plan to increase their influence and extend learning beyond the class.

858 Project Management and the Drug Development Process  
Fall. 3(3-0) RB: Some experience working on laboratory or clinical research projects is useful.
Project management standards and best practices in drug development process, including clinical trials.

870 Research Rotation  
Fall, Spring, Summer. 1 to 4 credits. A student may earn a maximum of 12 credits in all enrollments for this course. RB: Open only to first year graduate students in Pharmacology and Toxicology. R: Approval of department.
Individual work on selected research problems.

899 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.

910 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.

980 Problems  
Fall, Spring. 2 to 5 credits. A student may earn a maximum of 20 credits in all enrollments for this course. R: Open only to graduate students. Approval of department.
Limited work in selected research projects.

999 Doctoral Dissertation Research  
Fall, Spring, Summer. 1 to 24 credits. A student may earn a maximum of 70 credits in all enrollments for this course. R: Open to graduate students in the Department of Pharmacology and Toxicology. Approval of department.
Doctoral dissertation research.