PHARMACOLOGY  PHM
AND TOXICOLOGY

Department of Pharmacology
and Toxicology
College of Veterinary Medicine

340 Principles of Drug Action
Summer. 1(1-0) P: CEM 251 or CEM 252 or
PSL 250 or PSL 310 RB: Chemistry and/or
Physiology background recommended. R: Open
to undergraduate students or lifelong graduate
students or lifelong undergraduate
students. Not open to students with credit in
PHM 350.
Factors influencing drug action. Absorption, distribu-
tion, and elimination of drugs. Factors controlling
intensity, selectivity of drug action, and nature of
drug action. Mismatches of drug presence and drug
action including receptor effector coupling mechan-
isms and mechanisms of tolerance to drug action.
Offered first half of semester.

350 Introductory Human Pharmacology
Fall, Spring. 3(3-0) P: (PSL 250 or PSL 310) or
(PSL 431 and PSL 432) R: Not open to freshmen.
General principles of pharmacology. Central and
autonomic nervous systems. Cardiovascular and
renal drugs. Chemotherapy. Anti-infective drugs and
endocrine agents.

431 Pharmacology of Drug Addiction
Fall. 3(3-0) RB: Zoology or Human Biology or
Psychology or Biochemistry or Physiology.
Introduction to pharmacology and neuropharmacol-
ogy. Understanding of the biological basis for drug
abuse and addiction.

450 Introduction to Chemical Toxicology
Spring. 3(3-0) P: (BS 110 or LBS 144) and
(BS 111 or LBS 145 or BS 111) and CEM
251 R: Not open to freshmen or sopho-
more.
Mammalian toxicology. Disposition of chemicals in
the body, detoxication, elimination, and mechanisms
of toxicity in major organ systems. Selected toxic
agents.

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

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

563 Medical Pharmacology
Summer. 3(3-0) R: Open only to graduate-
professional students in the colleges of Hu-
man and Osteopathic Medicine.
General principles of pharmacology and selected
drugs. Rational drug therapy.

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 applica-
tions of pharmacological principles. Evaluation of
new drugs, drug advertising, and adverse drug
reactions.

658 Research Problems in Pharmacology or
Toxicology
Fall, Spring. Summer. 1 to 3 credits. A stu-
dent 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 Medi-
cine. R: Approval of department.
Selected research problems in pharmacology or
toxicology.

804 Molecular and Developmental
Neurobiology
Fall. 3(3-0) Interdepartmental with Neuro-
science and Pathobiology and Diagnostic In-
vestigation and Psychology and Zoology.
Administered by Neuroscience. RB: Bache-
lor's degree in a Biological Science or Psy-
chology. R: Open to graduate students in
Neuroscience major.
Nervous system specific gene transcription and
translation. Maturation, degeneration, plasticity,
and repair in the nervous system.

806 Advanced Neuroscience Techniques
Laboratory
Spring, Summer. 3(3-0) Interdepartmental with Neu-
roscience and Physical Medicine and Reha-
bitation and Psychology and Radiology.
Administered by Neuroscience. RB: PHM
827 R: Open only to doctoral students in the
Neuroscience major.
Methods and underlying principles of neuroscience
research.

810 Synaptic Transmission
Spring of odd years. 3(3-0) R: Open to
graduate students or approval of depart-
ment.
Chemical and electrical aspects of nerve impulse
transmission at synaptic and neuroeffector junctions.
Influence of drugs.

813 Cardiovascular Pharmacology
Spring of even years. 3(3-0) R: Open to
graduate students or approval of depart-
ment.
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 Di-
agnostic Investigation. Administered by
Pharmacology and Toxicology. P: PHM 819
Biochemical, molecular, and physiological mechan-
isms of toxicity. Functional and pathological
responses of major organ systems to chemical
insult. Mechanisms of mutagenesis, carcinogene-
sis, and reproductive toxicity. Concepts in risk
and safety assessment.

819 Principles of Drug-Tissue Interactions
Fall, Spring, Summer. 1 to 2 credits. A stu-
dent may earn a maximum of 3 credits in all
enrollments for this course. R: Open to
graduate students or lifelong graduate stu-
dents.
General principles relevant to the interaction of
chemicals with biological systems. Topics include
pharmacokinetics and/or pharmacodynamics.

820 Cellular, Molecular and Integrated
Systems Pharmacology and Toxicology
Fall. 4(4-0) P: BMB 801 and BMB 802 and
PHM 827 and PSL 828 R: Open to graduate
students or approval of department.
Comprehensive overview of the cellular and molecu-
lar mechanisms of drug and chemical actions on
the major organ systems of humans and other mam-
mals.

827 Physiology and Pharmacology of
Excitable Cells
Fall. 4(4-0) Interdepartmental with Neuro-
science and Physiology and Zoology. Admi-
nistered by Pharmacology and Toxicology.
RB: PSL 431 or PSL 432 or BMB 401 or
BMB 461 or ZOL 402
Function of neurons and muscle at the cellular level:
membrane biophysics and potentials, synaptic
transmission, sensory nervous system function.

829 Neuropharmacology
Fall. 2(2-0) P: PHM 819 RB: Some back-
ground in physiology. R: Open to master's
students or doctoral students or lifelong
graduate students.
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. Offered first ten weeks of semester.

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 bio-
medical sciences.

831 Endocrine Pharmacology
Fall. 2(2-0) Not open to students with credit
in PHM 820.
Physiology, pharmacology, and toxicology of the
endocrine system. Endocrine diseases, pharmaco-
logical 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

832  Applied Integrative Pharmacology Laboratory
Summer. 4(2-4) P: 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. Integrative and organ-level pharmacology. Regulatory issues in the use of experimental animals, animal models of diseases, animal and tissue preparation for whole-animal and organ-level pharmacology experiments, experimental design, data collection, data analysis, and data interpretation.

833  Gastro-Intestinal and Liver Pharmacology
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
Spring. 2(2-0) RB: Some prior course work in physiology or pharmacology. Integrative study of drugs, their mechanism of action, and their side effects in the treatment of major diseases and pathologies of the respiratory system.

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.

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.

850  Communications for Biomedical Researchers
Summer. 2(2-0) Effective research and business communication, including written and verbal skills for a variety of audiences and purposes.

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
Spring. 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.

855  The Business of Biomedical Research Organizations
Spring. 2(2-0) Theories, methods, terminology, and culture of business as used in biomedical research and development environments.

857  Project Management
Summer. 2(2-0) Formal project management culture, principles, knowledge areas, and terminology. Specific tools and techniques including work breakdown structure, earned value analysis, risk management, and quality control for managing scientific research. Offered first ten weeks of semester.

858  Drug Development Process
Fall. 3(3-0) RB: Some experience working with laboratory or clinical research projects. 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.

895  Applied Project in Integrative Pharmacology
Fall, Spring, Summer. 3 to 6 credits. A student may earn a maximum of 6 credits in all enrollments for this course. P: PHM 819 and PHM 830 and PHM 832 RB: All coursework for the MS in Integrative Pharmacology should be completed prior to beginning the Applied Project unless there is Departmental approval to complete final courses concurrently with the Applied Project. R: Open to masters students in the Department of Pharmacology and Toxicology. Approval of department. An opaque project that addresses a research, theoretical, or applied problem in whole-animal or organ level pharmacology, in cooperation with the students’ employer or laboratory partner.

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, Summer. 2 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.

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.