

Course Descriptions

510. (INSC596) Neuropharmacology/Neurochemistry. (B)

Steve Thomas. *Prerequisite(s):* Permission of course director. *Meets two times per week.*

Neurochemistry and neuropharmacology of the central nervous system. Lectures cover the structure and properties of neurons, neurotransmitters and signal transduction. Students are expected to already have an understanding of the material in Cooper, Bloom and Roth, THE BIOCHEMICAL BASIS of NEUROPHARMACOLOGY, or its equivalent. Course readings will be both primary and review articles.

532.(CAMB532) Human Physiology.

Martin Pring and Kevin Foksett. *Prerequisite(s):* Although not a formal prerequisite, a good foundation in cell biology at the level of BIOM/CAMB 600 (or an equivalent upper level undergraduate course) is strongly recommended. *Meets three times per week.*

This course will present a survey of the physiology of most of the major organ systems. It will integrate knowledge of cellular and molecular mechanisms into an understanding of function at the tissue, organ and organism levels. It will begin with a brief review of membrane physiology, followed by electrophysiology and signaling in nerves. Then, after a brief outline of neural control systems and their role in homeostasis, it will present motility and muscle, the cardiovascular system, respiration, the renal system, selected topics from the endocrine system, the physiological responses to altitude, temperature and exercise, and the gastrointestinal system. As well as providing a basis of integrative physiology for students in fields such as bioengineering and pharmacology, it should be of interest to students of cellular and molecular biology and genetic engineering who will need to appreciate the roles of specific systems and molecules at higher levels of organization.

SM 542. (CAMB542) Topics in Molecular Medicine. (A)

Skip Brass, MD, PhD; Gary Koretzky, MD, PhD; Mark Kahn, MD. *Prerequisite(s):* Permission of the course directors. The course is designed primarily for combined degree (MD/PhD) students, but will be available to all medical and graduate students as space permits. Priority will be given to 1st and 2nd year combined degree students. The optimal class size will be 14. *Tentatively, the course will meet for one hour from 4 - 5 pm on Wednesday afternoons with occasional double sessions that will be two hours long.*

TiMM is planned as a once-weekly seminar course whose goal is to introduce students to the ways in which biomedical research can provide new insights into clinical medicine and, conversely, how knowledge of clinical disease impacts scientific discovery.

550. (INSC576, PSYC750) Advanced Topics in Neuropsychopharmacology. (A)

Lucki and staff. *Prerequisite(s):* Permission of instructor. *Meets two times per week.*

Biological issues relevant to neuropsychiatric illnesses are covered in detail in four sections. The first section covers clinical aspects of major psychiatric disorders and includes some contact with patients. The second section presents the neuroanatomy of the limbic system. In the third section, emphasis is on the mechanisms of action of psychotropic drugs, including antidepressants, antipsychotics, anxiolytics, and stimulants. The final section covers information relevant to understanding biological processes that may be abnormal in neuropsychiatric illnesses, such as stress, sleep, and circadian rhythms, as well as quantitative genetics.

570. Principles of Cardiovascular Biology. (A)

Drs. Vladimir Muzykantov and Emer Smyth. *Prerequisite(s):* Permission of course director.

Lectures to be presented by various Medical School faculty members. Topics covered include: general principles of vascular biology and hemodynamics, endothelial cells and integral vascular functions, signaling in the cardiovascular system, angiogenesis, hemostasis and thrombosis, platelets, platelet/vascular interactions, vascular integrins and adhesion molecules, vascular inflammation and oxidative stress, white blood cells, vasoactive compounds and drugs, mechanisms of atherosclerosis, cholesterol and lipid metabolism, hypertension, novel vascular directed gene and enzyme therapies.

SM 580. Topics In Pharmacogenetics. (B)

Dr. A. Steven Whitehead *Prerequisite(s):* Permission of course director.

This is a "literature-based" course (i.e. a seminar course/literature survey). It will survey the emerging technologies

and computational advances that have permitted the field of pharmacogenetics to mature into a major biomedical discipline over the past few years. It will consider the likely impact on disease target identification, the development of new drugs for established and "niche" markets, the advent of "personalized medicine", including the selection of therapies that have maximum efficacy and minimum side-effect profiles. This course will also touch on some of the ethic issues associated with the routine genetic testing of patients to facilitate treatment choices and clinical monitoring.

590. Molecular Toxicology: Chemical and Biological Mechanisms. (A)

Dr. Trevor M. Penning. *Prerequisite(s):* Must have taken or will take Fundamentals of Pharmacology concurrently. Undergraduate course work in biochemistry and chemistry essential. Exceptions allowed based on past course work. Please consult with Course Director. Students: All 1st and 2nd year GGPS, CAMB, Neuro and BSTA students with required prerequisites; residents in Environmental and Occupational Health, and professional masters students (MPH and MTR).

Course Goals: Exposures to foreign compounds (drugs, carcinogens, and pollutants) can disrupt normal cellular processes leading to toxicity. This course will focus on the molecular mechanisms by which environmental exposures lead to end-organ injury and to diseases of environmental etiology (neurodegenerative and lung diseases, reproduction disruption and cardiovascular injury). Students will learn the difficulties in modeling response to low-dose chronic exposures, how these exposures are influenced by metabolism and disposition, and how reactive intermediates alter the function of biomolecules. Mechanisms responsible for cellular damage, aberrant repair, and end-organ injury will be discussed. Students will learn about modern predictive molecular toxicology to classify toxicants, predict individual susceptibility and response to environmental triggers, and how to develop and validate biomarkers for diseases of environmental etiology. Students are expected to write a term paper on risk assessment on an environmental exposure using available TOXNET information.

600. Medical Pharmacology.

Axelsen and Staff. *Prerequisite(s):* Permission of the instructor. *Class meets four days a week.*

This course will review basic human physiology pertinent to drug action, and then focus on the mechanisms of action of the various classes of agents used in the therapy of human disease. It consists of lectures by an array of faculty with special interests and expertise in the topic being presented. Drug classes covered include: Neuropsychiatric drugs, cardiovascular and hematological drugs, anticancer drugs, antimicrobial drugs, endocrine and metabolic drugs.

623. Fundamentals of Pharmacology. (D)

Dr. David Manning and Staff. *Prerequisite(s):* Permission of course director. *Meets three times per week.*

This course is designed to introduce students to basic pharmacological concepts with special emphasis on the molecular actions of drugs. Subject matter includes use of microcomputers to analyze pharmacological data.

630. (BMB 700, CHEM700) Frontiers in Bioorganic and Medicinal Chemistry. (A)

Drs. Ian Blair, Barry Cooperman, Dewey McCafferty. *Prerequisite(s):* Permission of the courses directors.

This advanced course for graduate students will be based primarily on didactic lectures from three Penn faculty. Permission for a student to participate should first be obtained from one of the participating faculty. A solid background in chemistry and biochemistry will be required. Overviews of current and emerging topics in bioorganic and medicinal chemistry will be presented. Students will be given short "take home" problem sets, two formal interim examinations, and a formal final examination during the semester. Topics that will be covered over the semester include: Mass spectrometry of DNA and DNA-adducts, Synthetic peptides/peptide mimics/proteins, including the expansion of the genetic code; methods of synthesis and applications, Synthetic RNAs, DNAs and nucleic acid mimics: methods of synthesis and applications, Synthetic oligosaccharides: methods of synthesis and applications, Combinatorial chemistry, Enzymology of translation, Antibiotic biosynthesis, Introduction to drug metabolism, Characterization of drug metabolites, Characterization of reactive metabolites from drugs and endogenous molecules, DNA-adducts from drugs and endogenous molecules, Lipidomics in drug development.

632. Cell Control by Signal Transduction

Drs. Jeff Field and Hianxin Hua. How do extracellular signals regulate cells and how do cells respond to these signals? Answers to these questions are crucial for understanding the molecular cascades that control cell function

as well as the process of tumorigenesis. This course, "Cell control by signal transduction pathways", will examine how various signal transduction pathways influence cell functions such as gene transcription, protein translation, intracellular protein trafficking, and cell proliferation. The primary signal transduction pathways to be examined include those mediated by PI-3 kinase, Notch, TGFbeta, NF-kB, Wnt, and Ras.

660. Frontiers in Cancer Pharmacology. (A)

Dr. Ian A. Blair. *Prerequisite(s):* Permission of the course director.

This advanced course for graduate students combines didactic lectures from Penn faculty with oral presentations and oral assignments from the students. Students should have either completed PHRM 560, Principles in Cancer Signaling and Therapeutics or PHRM 640, Topics in Cancer Pharmacology or equivalent classes. The faculty will present overviews of current and emerging topics in cancer pharmacology. Emphasis of the presentations will be on the translation of basic science discoveries into therapeutic agents. Students will choose related topics to explore in more detail. In consultation with Dr. Blair, students will prepare a 45-minute presentation (using Power Point slides). Each student will give at least two presentations during the semester. The faculty teaching the course will be available for help with the presentations. The written assignment will involve a 10-page double spaced paper (exclusive of references) with a maximum of 25 references. The assignment will consist of a literature review in the area of one of the presentation topics chosen by the student. Additional information can be obtained from the Center for Cancer Pharmacology web site: <http://www.med.upenn.edu/ccp/>

670. Current Topics in Neuropharmacology. (A)

Dr. James Eberwine.

699. Laboratory Rotation.

799. Independent Study. (C)

899. Pre-Dissertation Lab Rotation. (C)