Course Descriptions

510. Neurotransmitter Signaling & Pharmacology (PHRM 510/NGG 510) (C)
Dr. Steve Thomas; Dr. Chris Pierce; Dr. Teresa Reyes. A) Provide in-depth information on neurotransmitters and their associated signaling systems. Emphasis will be placed on the wealth of new molecular information that has been gathered to examine how neurons function and communicate. B) Develop skills to appreciate, present and critically evaluate the current literature in neurotransmitter signaling and neuropharmacology. Most students will have had 3 graduate level Neuroscience courses by the time they take this class.

534. Experimental Genome Science (PHRM 534/GCB 534) formerly Introduction to Genome Science (PHRM 531/GCB 531) (A)
Dr. John Hogenesch and Dr. John Murray. This course serves as an introduction to the main laboratory and theoretical aspects of genomics and computational biology. The main topics discussed center around the analysis of sequences (annotation, alignment, homology, gene finding, variation between sequences, phylogeny reconstruction/estimation), and the functional analysis of genes (expression levels, proteomics, screens for mutants), together with a discussion of gene mapping, linkage disequilibrium, genetics of complex diseases, and integrative genomics.

532 Human Physiology (PHRM 532/CAMB532). (A)
Dr. Kevin Foskett and Dr. Todd Lamitina. 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. Class 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.

542. (CAMB542) Topics in Molecular Medicine. (A)
Dr. Ben Stanger and Dr. Rahul Kholi. 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. (PHRM 550/ NGG 576/PSYC750) Advanced Topics in Neuropsychopharmacology. (A)
Dr. Irwin 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.

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 ethical 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 PGG, 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 lowdose 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. (C)
Paul Axelsen, Judy Meinkoth, Akiva Cohen . Prerequisite(s): Permission of the instructor. Class meets two 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. (C)
Dr. David Manning and Staff. Prerequisite(s): Permission of course director. Meets four 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.

632. Cell Control by Signal Transduction. (C)
Drs. Jeff Field and Xianxin 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 functions as well 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.

640. Topics in Cancer Pharmacology. (A)
Dr. Ian a. Blair
Literature based course of current literature on topics such as cancer cell signalling, cancer genetics, hormonal carcinogenesis, environmental carcinogens, chemo- and gene therapy of cancer, cancer epidemiology and prevention. New hypotheses in cancer etiology, prevention and treatment will be discussed as they appear in the literature. The aim of the course is to introduce students to the latest development in the
above areas related to cancer pharmacology through student oral presentations of
journal article(s) provided by lecturers. Attendance is required at all lectures and
presentations

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.

670. Current Topics in Neuropharmacology. (A)
Dr. James Eberwine. This is a seminar course covering emerging topics of molecular
biology as they apply to neuropharmacology. Generally, three or four topics are covered
each year. These topics change from year to year.

699. Laboratory Rotation.

799. Independent Study. (C)

899. Pre-Dissertation Lab Rotation. (C)
Director: PGG Faculty
Schedule: 20 h per week in Fall and Spring; 40 h per week in Summer
Course units: 2
Laboratory rotations are described as a separate section below.

COURSE EVALUATIONS
Appendix X contains student evaluations for all PGG courses for the last three years.

LABORATORY ROTATIONS
Three laboratory rotations are required of each PGG student. Students can pursue
rotations at any time during the first two years. The first rotation is usually taken in