PHARMACOLOGY (PHRM)

PHRM 495 High Throughput Discover
Course usually offered in spring term
Also Offered As: CHEM 495
Activity: Laboratory
1 Course Unit

PHRM 510 Neurotransmitter Signalling & Neuropsychopharmacology
The goals of this course are three-fold: 1) Provide an overview of major psychiatric disorders. 2) Provide in-depth information on neurotransmitters, emphasizing the wealth of new molecular information on how neurons function and communicate, as well as the basis for psychotherapeutics (one class per week). 3) Develop skills to appreciate, present and critically evaluate the current literature in neurotransmitter signaling and neuropsychopharmacology (one class per week).
Taught by: Staff Dr. Steve Thomas; Dr. Chris Pierce; Dr. Wade Berrettini; Dr. Liz Heller
Course offered spring; even-numbered years
Also Offered As: NGG 510
Prerequisite: Permission of course director
Activity: Lecture
1 Course Unit
Notes: Meets two times per week.

PHRM 532 Human Physiology
Also Offered As: CAMB 532
Activity: Lecture
1 Course Unit

PHRM 534 Experimental Genome Sci
Also Offered As: GCB 534
Activity: Lecture
0.01 Course Units

PHRM 535 Intro To Bioinformatics
Course usually offered in spring term
Also Offered As: GCB 535
Activity: Lecture
1 Course Unit

PHRM 542 Topics in Molecular Medicine
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.
Taught by: Skip Brass, MD, PhD; Gary Koretzky, MD, PhD; Mark Kahn, MD
Course usually offered in fall term
Also Offered As: CAMB 542
Prerequisite: Permission of the course directors
Activity: Seminar
1 Course Unit
Notes: 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 2st 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.

PHRM 550 Advanced Topics in Neuropsychopharmacology
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.
Taught by: Lucki and staff
Course usually offered in spring term
Also Offered As: PSYC 750
Prerequisite: Permission of instructor
Activity: Lecture
1 Course Unit
Notes: Meets two times per week.

PHRM 564 DRUG DELIVERY
In this course, students will learn about drug delivery systems with emphasis on targeted therapeutics and translational nanomedicine. The course will be directed and taught by Miriam Wattenbarger (CBE) and Vladimir Muzykantov (PHRM). Lectures will also be given by other faculty from the Penn School of Engineering and Applied Science and the School of Medicine. The four main topics for the course are traditional drug delivery, drug delivery systems and nanocarriers, targeted and smart drug delivery systems, and translational aspects of drug delivery systems. There will be a midterm, final, and a group project for the course. Students will form small groups for the project and research a drug delivery topic to propose an extension of a current research area.
An oral and written proposal will be given by each group to the class at the end of the semester. The course is open to SEAS seniors and graduate students, SAS college pre-med, pre-BE and pre-BGS seniors, biotechnology MS students, PGG and BGS graduate students, Wharton and Dental School students.
Also Offered As: CBE 564
Activity: Lecture
1 Course Unit

PHRM 570 Principles of Cardiovascular Biology
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.
Taught by: Drs. Vladimir Muzykantov and Tilo Grosser
Course usually offered in spring term
Prerequisite: Permission of course director
Activity: Lecture
1 Course Unit
**PHRM 590 Molecular Toxicology: Chemical and Biological Mechanisms**

**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.

**Taught by:** Dr. Trevor M. Penning

**Course usually offered in spring term**

**Also Offered As:** REG 590

**Prerequisites:** Pre-requisites: 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).

**Activity:** Lecture

**1 Course Unit**

**PHRM 600 Medical Pharmacology BIOM 600**

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.

**Taught by:** Axelsen and staff. This course is centered on the molecular basis of drug action. It is comprised of four 1-hour lectures per week (as described for PHRM 600) and supplemented with weekly problem sets and readings designed to reinforce and expand upon materials presented in lecture. Student evaluation is based on four exams and weekly problem sets. PHRM 624 is required of all 2nd year PGG students. PGG students must co-enroll in PHRM 532/CAMB 532 (Human Physiology).

**Prerequisites:** Cell Biology (BIOM 600).

**Activity:** Lecture

**1 Course Unit**

**Notes:** Meets three times per week

**PHRM 623 Fundamentals of Pharmacology**

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.

**Taught by:** Dr. Jeffrey Field and staff

**Course usually offered in fall term**

**Also Offered As:** REG 623

**Prerequisite:** Permission of course director

**Activity:** Lecture

**1 Course Unit**

**Notes:** Meets three times per week

**PHRM 624 Medical Pharmacology**

This course will review basic human physiology pertinent to drug action. It is comprised of four 1-hour lectures per week (as described for PHRM 600) and supplemented with weekly problem sets and readings designed to reinforce and expand upon materials presented in lecture. Student evaluation is based on four exams and weekly problem sets. PHRM 624 is required of all 2nd year PGG students. PGG students must co-enroll in PHRM 532/CAMB 532 (Human Physiology).

**Prerequisites:** Cell Biology (BIOM 600).

**Activity:** Lecture

**2 Course Units**

**PHRM 632 Cell Cont Sig Trans Path.**

**Course usually offered in spring term**

**Also Offered As:** CAMB 632

**Activity:** Seminar

**1 Course Unit**
PHRM 640 Topics in Cancer Pharmacology
Reviews of current literature on topics such as cancer cell signaling, cancer genetics, hormonal carcinogens, 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 the students to the latest development in the above areas related to cancer pharmacology.

Taught by: Dr. Judy Meinloth and Dr. Wenchao Song
Course usually offered in spring term
Prerequisite: permission of course directors
Activity: Lecture
1 Course Unit
Notes: Class meets Wednesdays, 1:00 - 3:00; Fall semester

PHRM 650 Participation in the "Dr. George W. Raiziss Biochemical Rounds", a weekly seminar program sponsored by the Department of Biochemistry and Biophysics. Program deals with a wide range of modern biochemical and biophysical topics presented by established investigators selected from our faculty, and by leading scientists from other institutions.

Taught by: Black, B. & Shorter, J.
Also Offered As: BMB 650, CAMB 702
Prerequisites: Course is limited to BGS graduate students and undergrads from the Vagelos Scholars Program.
Activity: Seminar
1 Course Unit

PHRM 657 Haz Waste Health Effects
Also Offered As: ENVS 657
Activity: Lecture
1 Course Unit

PHRM 660 Frontiers in Cancer Pharmacology
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/

Taught by: Dr. Ian A. Blair
Course usually offered in fall term
Prerequisite: Permission of the course director
Activity: Lecture
1 Course Unit

PHRM 699 Laboratory Rotation
Activity: Laboratory
1 Course Unit

PHRM 799 Independent Study
One-term course offered either term
Activity: Independent Study
0.5 Course Units

PHRM 899 Pre-Dissertation Lab Rotation
Activity: Laboratory
1 Course Unit

PHRM 999 Research in Pharmacology
Independent or collaborative research in various fields of pharmacology arranged individually with members of the staff.
One-term course offered either term
Prerequisite: Permission of staff member
Activity: Independent Study
1 Course Unit