

***BBS***

***FALL COURSES***

***2009***

**Yale University  
Combined Program in the Biological and Biomedical Sciences**

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## Building Abbreviations

### Medical School

AMISB	Amistad Building	10 Amistad St.
BCMM	Boyer Center for Molecular Medicine	295 Congress Ave.
BML	Brady Memorial Laboratory	310 Cedar St.
CB	Clinic Building	789 Howard Ave.
CMHC	CT Mental Health Center	34 Park St.
CP	Congress Place	301 Cedar St.
ESH	Edward S. Harkness Memorial Hall	367 Cedar St.
FMB	Farnam Memorial Building	310 Cedar St.
HRT	Hunter Radiation Therapy	15 York St.
JEH	Jane Ellen Hope Building	315 Cedar St.
JPL	John Pierce Laboratory	290 Congress Ave.
LEPH	Laboratory of Epidemiology and Public Health	60 College St.
LH	Lauder Hall	310 Cedar St.
LLCI	Lippard Laboratory of Clinical Investigation	15 York St.
LMP	Laboratory for Medicine and Pediatrics	15 York St.
LSOG	Laboratory for Surgery, Obstetrics, and Gynecology	375 Congress Ave.
NSB	Nathan Smith Building	333 Cedar St.
SHM	Sterling Hall of Medicine	333 Cedar St.
TAC	The Anlyan Center for Medical Research and Education	300 Cedar St.
WWW	William Wirt Winchester Building	25 York St.
YCHRC	Yale Child Health Research Center	464 Congress Ave.
YPI	Yale Psychiatric Institute	184 Liberty Street

### Science Hill/Main Campus

AKW	Arthur K. Watson Hall	51 Prospect St.
Bass	Bass Center for Molecular and Structural Biology	266 Whitney Ave.
BCT	Becton Engineering and Applied Science Center	15 Prospect St.
CRB	Chemistry Research Building	Prospect St.
DL	Dunham Laboratory	10 Hillhouse Ave.
ESC	Environmental Science Center	21 Sachem St.
GML	Greeley Memorial Laboratory	370 Prospect St.
JWG	Gibbs Laboratories	260 Whitney Ave.
KBT	Kline Biology Tower	219 Prospect St.
KCL	Kline Chemistry Laboratory	225 Prospect St.
MEC	Malone Engineering Center	55 Prospect St.
ML	Mason Laboratory	9 Hillhouse Ave.
OML	Osborn Memorial Laboratories	165 Prospect St.
SCL	Sterling Chemistry Laboratory	225 Prospect St.
SPL	Sloane Physics Laboratory	217 Prospect St.
SSS	Sheffield-Sterling-Strathcona Hall	1 Prospect St.

## CELL BIOLOGY

### **CBIO 502a, Molecules to Systems. James Jamieson, Fred Gorelick, Peter Takizawa, Thomas Lentz.**

This full-year course is designed to provide medical students with a current and comprehensive review of biologic structure and function at the cellular, tissue, and organ system levels. Areas covered include replication and transcription of the genome; regulation of the cell cycle and mitosis; protein biosynthesis and membrane targeting; cell motility and the cytoskeleton; signal transduction; nerve and muscle function; and endocrine and reproductive cell biology. Clinical correlation sessions, which illustrate the contributions of cell biology to specific medical problems, are interspersed in the lecture schedule. Histophysiology laboratories provide practical experience with the light microscope for exploring cell and tissue structure. This course is offered only to M.D. and M.D./PH.D. students.

**Monday, 4:30 - 6:00 p.m., Hope 110.**

### **CBIO 601a, Molecular and Cellular Basis of Human Disease. Staff.**

This course emphasizes the connections between diseases and basic science using a lecture and seminar format. It is designed for students who are committed to a career in medical research, those who are considering such a career, or students who wish to explore scientific topics in depth. The course is organized in four- to five-week blocks that topically parallel CBIO 502a,b. Examples of blocks from past years include “Diseases of protein folding” and “Diseases of ion channels.” Each topic is introduced with a lecture given by the faculty. The lecture is followed by sessions in which students review relevant manuscripts under the supervision of a faculty mentor. Several special sessions are dedicated to technologic advances. In addition, three sessions are devoted to academic careers and cover subjects such as obtaining an academic position, promotions, and grant writing. The course is open to M.D. and M.D./PH.D. students who are taking or have taken Cell Biology 502a,b. Student evaluations are based on attendance, participation in group discussions, formal presentations, and a written review of an NIH proposal.

**Monday, 4:30 – 6:00 p.m., ESH 311.**

### **CBIO 602a, Molecular Cell Biology. Sandra Wolin, Craig Crews, Thomas Melia, Thomas Pollard.**

A comprehensive introduction to the molecular and mechanistic aspects of cell biology for graduate students in all programs. Emphasizes fundamental issues of cellular organization, regulation, biogenesis, and function at the molecular level.

**Monday and Wednesday, 1:45 - 3:00 p.m., Hope 216.** Also MB&B 602a and MCDB 602a.

### **CBIO 603a, Seminar in Molecular Cell Biology. Sandra Wolin, Thomas Pollard, Craig Crews, and Faculty.**

A graduate-level seminar course in modern cell biology. The class is devoted to the reading and critical evaluation of classical and current papers. The topics are coordinated with the CBIO 602a lecture schedule. Thus, concurrent or previous enrollment in CBIO 602a is required.

**Thursday, 9:00 – 11:00 a.m., SHM C-225A.** Also MCDB 603a.

### **CBIO 900a, First-Year Introduction to Research. Frank Slack.**

Lab rotations, grant writing, and ethics for Molecular Cell Biology, Genetics and Development Track students.

**Monday, 4:00 – 5:30 p.m., KBT 102.** Also GENE 900a, MCDB 900a.

## CELLULAR & MOLECULAR PHYSIOLOGY

### **C&MP 520a, Current Prospectives in Physiology. Susumu Tomita, Yufeng Zhou.**

This seminar course explores a diverse range of current topics in physiology, emphasizing readings and discussions of recent primary literature. A variety of expert physiologists present topics such as structural biology, membrane transport, signal transduction, sensory systems and exercise physiology. Instructors guide the discussion regarding the background, the experiments, the methods, and most importantly the impact of relevant research papers. The aim of the course is to understand how physiological approaches integrate the study of organismal function from genes, to systems, to behavior and disease.

**Tuesday and Thursday, 2:30 – 3:45 p.m., SHM B-147.**

### **C&MP 550a, Physiological Systems. Mark Saltzman, Emile Boulpaep.**

The course develops a foundation in human physiology by examining the homeostasis of vital parameters within the body, and the biophysical properties of cells, tissues, and organs. Basic concepts in cell and membrane physiology are synthesized through exploring the function of skeletal, smooth, and cardiac muscle. The physical basis of blood flow, mechanisms of vascular exchange, cardiac performance, and regulation of overall circulatory function are discussed. Respiratory physiology explores the mechanics of ventilation, gas diffusion, and acid-base balance. Renal physiology examines the formation and composition of urine and the regulation of electrolyte, fluid, and acid-base balance. Organs of the digestive system are discussed from the perspective of substrate metabolism and energy balance. Hormonal regulation is applied to metabolic control and to calcium, water, and electrolyte balance. The biology of nerve cells is addressed with emphasis on synaptic transmission and simple neuronal circuits within the central nervous system. The special senses are considered in the framework of sensory transduction. Weekly discussion sections provide a forum for in-depth exploration of topics. Graduate students evaluate research findings through literature review and weekly meetings with the instructor.

**Monday, Wednesday, and Friday, 9:25 – 10:15 a.m., Mason Lab.** Also ENAS 350a/550a, MCDB 310a/550a.

## COMPUTATIONAL BIOLOGY & BIOINFORMATICS

### **CBB 740a, Clinical and Translational Informatics. Michael Krauthammer, Richard Shiffman.**

The course provides an introduction to clinical and translational informatics. Topics include (1) overview of biomedical informatics, (2) design, function, and evaluation of clinical information systems, (3) clinical decision making and practice guidelines, (4) clinical decision support systems, (5) standards, (6) issues in defining the clinical phenotype, and (7) topics in translational bioinformatics, including biological data types and data standards, building diagnostic and predictive tests based on genetic, epigenetic and transcriptional data, as well as infrastructure development in translational research.

**Permission of the instructor required.**

**Tuesday and Thursday, 10:30 - 11:45 a.m., 300 George Street, Suite 501.**

### **CBB 750a, Core Topics in Biomedical Informatics. Perry Miller.**

Introduction to common unifying themes that serve as the foundation for different areas of biomedical informatics, including clinical, neuro-, and genome informatics. The course is designed for students with significant computer experience and course work who plan to build computational tools for use in bioscience research. Emphasis is on understanding basic principles underlying informatics approaches to biomedical data modeling, interoperation among biomedical databases and software tools, standardized biomedical vocabularies and ontologies, modeling of biological systems, natural language text mining, and other topics of interest. The course involves lectures, class discussions, student presentations, and computer programming assignments. Permission of the instructor required.

**HTBA, 300 George Street, Suite 501.** Also MCDB 750a.

## **EXPERIMENTAL PATHOLOGY**

### **PATH 620a, Laboratory Rotations in Experimental Pathology. Gerald Shadel.**

Laboratory rotations for first-year graduate students.

### **PATH 680a, Seminar in Pharmacology and Molecular Medicine. Diane Krause.**

Readings and discussion in topics relevant to cell biology and molecular medicine. The class emphasizes analysis of primary research literature and development of presentation skills.

**Monday, 3:00 - 5:00 p.m., BML 137.**

### **PATH 690a, Molecular Mechanisms of Disease. Michael Robek.**

This course covers aspects of the fundamental molecular and cellular mechanisms underlying various human diseases. Many of the disorders discussed represent major forms of infectious, degenerative, vascular, neoplastic, and inflammatory disease. Additionally, certain rarer diseases that illustrate good models for investigation and/or application of basic biologic principles are covered in the course. The objective is to highlight advances in experimental and molecular medicine as they relate to understanding the pathogenesis of disease and the formulation of therapies.

**Tuesday and Thursday, 2:00 - 3:30 p.m., BCMM 206. This class will begin September 8.**

## GENETICS

**GENE 625a, Basic Concepts of Genetic Analysis.** Tian Xu, Antonio Giraldez, Michael Koelle, Richard Lifton, James Noonan, Shirleen Roeder, Scott Weatherbee.

The universal principles of genetic analysis in eukaryotes are discussed in lectures. Students also read a small selection of primary papers illustrating the very best of genetic analysis and dissect them in detail in the discussion sections. While other Yale graduate molecular genetics courses emphasize molecular biology, this course focuses on the concepts and logic underlying modern genetic analysis. Also MB&B 625a and MCDB 625au.

**Monday and Wednesday, 11:35 a.m. - 12:50 p.m., BASS 305.**

**GENE 631a, Topics in Genetic Epidemiology.** Hongyu Zhao, Elizabeth Claus, Ken Kidd.

This course deals with the interface of genetics and epidemiology as they relate to problems of public health, covering both the epidemiology of Mendelian disorders and the genetic and environmental contributions to common, complex genetic traits. Topics include study designs for assessing the importance of genetic factors (family, twin, and adoption studies), population genetics, and mapping and identification of genetic variants responsible for diseases through linkage and association analyses. Applications to various disease areas, such as cancer, obesity, psychiatry, and cardiovascular disease, are discussed. *Also BIS 631a.*

**Monday, 1:00 - 2:20 p.m., LEPH 108.**

**GENE 675a, Graduate Student Seminar.** James Noonan and staff.

Students gain experience in preparing and delivering seminars and in discussing presentations by other students. A variety of topics in molecular, cellular, developmental, and population genetics are covered. Required for all second-year students in Genetics. Graded Satisfactory/Unsatisfactory.

**Wednesday, 4:00 – 4:50 p.m., SHM I-304.**

**GENE 705a, Molecular Genetics of Prokaryotes.** See MB&B 705a.

**GENE 749a, Medical Impact of Basic Science.** See MB&B 749a.

**GENE 840a, Medical Genetics.** Margretta Seashore.

Clinical rotation, offering medical and graduate students the opportunity to participate in the Genetic Consultation Clinic, genetic rounds, consultation rounds, and genetic analysis of clinical diagnostic problems.

**GENE 900a, First Year Introduction to Research.** Frank Slack.

Lab rotations, grant writing, and ethics for Molecular Cell Biology, Genetics and Development Track students. Also CBIO 900a, MCDB 900a.

**Monday, 4:00 – 5:30 p.m., KBT 102.** Also CBIO 900a, MCDB 900a.

**GENE 921a, Reading Course in Genetics and Molecular Biology.** Charles Radding and staff.

Directed reading with faculty. Term paper required. Permission of Genetics DGS is required.

## IMMUNOBIOLOGY

**IBIO 530a/MCDB 530a, Biology of the Immune System.** Akiko Iwasaki.

The development of the immune system. Cellular and molecular mechanisms of immune recognition. Effector responses against pathogens; autoimmunity.

**Monday, Wednesday, and Friday, 9:25 - 10:15a.m., Room 102 0ML.**

**IBIO 600a, Introduction to Research. Al Bothwell and staff.**

Introduction to the research interests of the faculty. Required for all first-year BBS Immunology Track students. Pass/Fail.  
**Thursday, 4:30pm., Room TAC 624.**

**IBIO 603a/GENE 603a, Teaching in the Science Education Outreach Program (SEOP). Paula Kavathas.**

TAs, along with volunteers, teach three projects in Genetics to seventh-graders in two or three New Haven schools. In addition, TAs take a short course on teaching and serve as science judges. For more details visit [www.seop.yale.edu](http://www.seop.yale.edu).  
**Dates and times to be determined. BBS teaching credit**

## MICROBIOLOGY

### **MBIO 670a, Laboratory Rotation. Craig Roy.**

Rotation in three laboratories. Required for all first-year graduate students.

### **MBIO 680a, Molecular and Cellular Processes of Parasitic Eukaryotes. Diane McMahon-Pratt, Christian Tschudi.**

A broadly based seminar course on current research topics in cell and molecular parasitology with topics chosen from the current literature. Prerequisites: EMD 680a is highly recommended; permission of the instructor.

**Monday and Wednesday, 10:30 – 11:50 a.m., LEPH 108.**

### **MBIO 685a, Molecular Mechanisms of Microbial Pathogenesis. Jorge Galán, Craig Roy, Walter Mothes, John MacMicking, Hervé Agaisse, Brett Lindenbach.**

The course focuses on current topics related to host pathogen interactions. Each week a lecture is given on the topic followed by student presentations of seminal papers in the field. All participants are required to present a paper.

**Tuesday and Friday 10:00 - 11:30., BCMM 201.**

### **MBIO 701a, Research in Progress. Craig Roy.**

All students, beginning in their third year, are required to present their research once a year at the Graduate Student Research in Progress, held on Mondays at 2 p.m. These presentations are intended to give each student practice in presenting his or her own work before a sympathetic but critical audience and to familiarize the faculty with the research.

**Monday, 2:00 – 3:00 p.m., BCMM 206/208.**

### **MBIO 702a, Microbiology Seminar Series. Craig Roy.**

All students are required to attend all Microbiology seminars scheduled throughout the academic year. Microbiologists from around the world are invited to describe their research.

**Thursday, 4:00 – 5:00 p.m., Hope Building or BCMM 206/208.**

Other classes of interest:

**MB&B 705a, Molecular Genetics of Prokaryotes. Nigel Grindley, Catherine Joyce, Christine Jacobs-Wagner.**

## MOLECULAR BIOPHYSICS & BIOCHEMISTRY

### **MB&B 520a1, Boot Camp Biology.**

An intensive introduction to biological nomenclature, systems, processes, and techniques for graduate students with previous backgrounds in non-biological fields including physics, engineering, and computer science who wish to perform graduate research in the biological sciences.

[HTBA](#)

### **MB&B 600a, Principles of Biochemistry. Michael Koelle, Thomas Biederer.**

Rigorous introduction to the major concepts of biochemistry and to the process of discovery in this discipline, with emphasis on macromolecular conformation and physical processes in biochemistry. Energy metabolism, hormone signaling, and muscle contraction as examples of complex biological processes whose underlying mechanisms can be understood by identifying and analyzing the molecules responsible for these phenomena.

**Tuesday and Thursday, 11:35 a.m. - 12:50 p.m., DL 220. First meeting September 3.**

**MB&B 602a, Molecular Cell Biology.** See CBIO 602a. Also MCDB 602a.

**MB&B 625a, Basic Concepts of Genetic Analysis.** See GENE 625a. Also MCDB 625a.

### **MB&B 635a, Mathematical Methods in Biophysics. Yong Xiong, Liz Rhoades.**

Applied mathematical methods relevant to analysis and interpretation of biophysical and biochemical data will be covered. Students will apply these methods (statistics and error analysis, differential equations, linear algebra, and Fourier transforms) to analyze real data from research groups in MB&B.

**Monday, Wednesday, and Friday, 10:30 a.m. – 11:20 a.m., Bass 405. First meeting September 2.**

### **MB&B 650a, Lab Rotation for First-Year Students. Mark Solomon.**

Required for all first-year graduate students.

### **MB&B 705a, Lab Molecular Genetics of Prokaryotes. Nigel Grindley.**

Molecular aspects of the storage, replication, evolution, and expression of genetic material in prokaryotes. Prerequisites: previous or concurrent introductory courses in genetics and biochemistry.

**Monday and Wednesday, 11:35 a.m. - 12:50 p.m., Bass 405. First meeting September 2.** Also GENE 705a, MCDB 505a.

### **MB&B 720a, Macromolecular Structure and Biophysical Analysis. Andrew Miranker, Anna Pyle, Yong Xiong.**

An in-depth analysis of macromolecular structure and its elucidation using modern methods of structural biology and biochemistry. Topics include architectural arrangements of proteins, RNA, and DNA; practical methods in structural analysis; and an introduction to diffraction and NMR. Prerequisites: physical chemistry (may be taken concurrently) and biochemistry.

**Tuesday and Thursday, 11:35 a.m. - 12:50 p.m., Bass 305. First meeting September 3.**

### **MB&B 730a, Methods and Logic in Molecular Biology. Mark Solomon, Tony Koleske, Lynne Regan, Nigel Grindley.**

This course examines fundamental concepts in molecular biology through intense critical analysis of the primary literature. The objective is to develop primary literature reading and critical thinking skills. Required of and open only to first-year graduate students in MB&B.

**Tuesday and Thursday, 5:00 – 8:00 p.m., Bass 205. First meeting September 3.**

### **MB&B 749a, Medical Impact of Basic Science. Joan Steitz and staff.**

Consideration of examples of recent discoveries in basic science that have elucidated the molecular origins of disease or that have suggested new therapies for disease. Emphasis is placed on the fundamental principles on which these advances rely. Reading is from the primary scientific and medical literature, with emphasis on developing the ability to read this literature critically. Aimed primarily at undergraduates. Prerequisite: biochemistry or permission of the instructor.

**Monday and Wednesday, 1:00 – 2:15 p.m., SHM C-103. First meeting September 2.** Also GENE 749a.

### **MB&B 750a2, Biological Membranes. Thomas Biederer, Donald Engelman.**

Biological membranes and their resident proteins are essential for cellular function; yet comparatively little is known about their structure and dynamics. This class provides an introduction to the biochemistry and biophysics of lipids, lipid bilayers, and lipid-derived second messengers. In addition, structural as well as functional aspects of the different classes

of membrane proteins are discussed along with an outline of experimental approaches used to achieve an understanding of membrane protein structure and function at a molecular level. Prerequisite: biochemistry.

**Monday and Wednesday, 9:00 - 10:15 a.m., SHM C-125A. [First meeting TBA.](#)**

**MB&B 800a, Advanced Topics in Molecular Medicine. Susan Baserga, William Konigsberg.**

This seminar course, which covers topics in the molecular mechanisms of disease, illustrates timely issues in areas such as protein chemistry and enzymology, intermediary metabolism, nucleic acid biochemistry, gene expression, and virology. M.D. and M.D./Ph.D. students only. Prerequisite: biochemistry (may be taken concurrently).

**Monday 11:00 a.m. – 1:00 p.m., [Room TBA.](#) [First meeting TBA.](#)**

**MB&B 900a, Reading Course in Biophysics.**

Directed reading course in biophysics. Term paper required. By arrangement with faculty.

**MB&B 902a, Reading Course in Molecular Genetics.**

Directed reading course in molecular genetics. Term paper required. By arrangement with faculty.

**MB&B 904a, Reading Course in Biochemistry.**

Directed reading course in biochemistry. Term paper required. By arrangement with faculty.

## MOLECULAR, CELLULAR & DEVELOPMENTAL BIOLOGY

### **MCDB 500a, Biochemistry. L. Nicholas Ornston, Ronald Breaker, Donald Engelman.**

An introduction to the biochemistry of animals, plants, and microorganisms, emphasizing the relations of chemical principles and structure to the evolution and regulation of living systems.

**Monday, Wednesday, and Friday, 9:25 - 10:15 a.m., OML 202.**

**MCDB 505a, Molecular Genetics of Prokaryotes.** See MB&B 705a.

**MCDB 530a, Biology of the Immune System.** See IBIO 530a.

**MCDB 550a, Physiological Systems.** See C&MP 550a.

### **MCDB 602a, Molecular Cell Biology. Sandra Wolin, Thomas Pollard, Craig Crews, Thomas Melia.**

A comprehensive introduction to the molecular and mechanistic aspects of cell biology for graduate students in all programs. Emphasizes fundamental issues of cellular organization, regulation, biogenesis, and function at the molecular level.

**Monday and Wednesday, 1:45 - 3:00 p.m., HOPE 216.** Also CBIO 602a, MB&B 602a.

### **MCDB 603a, Seminar in Molecular Cell Biology. Sandra Wolin, Thomas Pollard, Craig Crews, and faculty.**

A graduate-level seminar course in modern cell biology. The class is devoted to the reading and critical evaluation of classical and current papers. The topics are coordinated with the MCDB 602a lecture schedule. Thus, concurrent or previous enrollment in MCDB 602a is required.

**Thursday 9:00 - 11:00 a.m., SHM C-225A.** Also CBIO 603a.

**MCDB 625a, Basic Concepts of Genetic Analysis.** See GENE 625a.

### **MCDB 660a, Structure, Function, and Development of Vascular Plants. Graeme Berlyn.**

Morphogenesis and adaptation of vascular plants considered from seed formation and germination to maturity.

Physiological and developmental processes associated with structural changes in response to environment discussed from both a phylogenetic and an adaptive point of view.

**Tuesday and Thursday, 4:00 - 5:20 p.m., GML 130.**

### **MCDB 720a, Neurobiology. Haig Keshishian, Paul Forscher.**

Examination of the excitability of the nerve cell membrane as a starting point for the study of molecular, cellular, and intercellular mechanisms underlying the generation and control of behavior.

**Monday, Wednesday, and Friday, 11:35 - 12:25 p.m., KBT 102.** Also NBIO 720a, NSCI 720a.

### **MCDB 721La, Laboratory for Neurobiology. Haig Keshishian, Robert Wyman.**

Optional laboratory. Introduction to the neurosciences. Projects include the study of neuronal excitability, sensory transduction, CNS function, synaptic physiology, and neuroanatomy.

**Tuesday or Wednesday, 1:30 - 6:00 p.m., OML 107.**

**MCDB 750a, Core Topics in Biomedical Informatics.** See CB&B 750a.

**HTBA and 300 George Street, Suite 501.**

### **MCDB 900a, First-Year Introduction to Research. Frank Slack and faculty.**

Lab rotations, grant writing, and ethics for Molecular Cell Biology, Genetics, and Development track students.

Also CBIO 900a, GENE 900a.

### **MCDB 950a and 951b, Second-Year Research.**

By arrangement with faculty.

## NEUROSCIENCE

**NSCI 501a/NBIO 501a, Principles of Neuroscience. Marina Picciotto, Mark Yeckel.**

General neuroscience seminar: Lectures, readings, and discussion of selected topics in neuroscience. Emphasis is on how approaches at the molecular, cellular, physiological, and organismal levels can lead to understanding of neuronal and brain function.

**Wednesday and Friday, 3:15 - 4:45 p.m., SHM I-116.**

**NSCI 519a/b, Tutorial**

By arrangement with faculty and approval of DGS.

**NSCI 590a, Sensory Neuroethology: Bats, Owls, Electric Fish and Beyond. James Mazer.**

In this course we will review the neurophysiology of sensory processing with particular attention to animal behavior (ethology) and computation. We will begin with the classic neuroethology literature and end with current work on neocortical circuits underlying sensory processing in higher vertebrates. This seminar course will meet once per week to

read and discuss (mostly) primary research papers selected and presented by the students.  
**Organizational meeting, Sept. 3, 4:00 p.m., SHM I-304.**

**NSCI 720a, Neurobiology.** See MCDB 720a.

The following course is also of particular value to students in Neuroscience:

**MCDB 721La, Laboratory for Neurobiology. Haig Keshishian, Robert Wyman.**

## PHARMACOLOGY

### **PHARM 502a, Seminar in Pharmacology and Molecular Medicine. Diane Krause.**

Readings and discussion in topics relevant to cell biology, signal transduction, immunology, and molecular medicine. The overall theme of the papers discussed is pathogenesis of human infectious disease. The class emphasizes analysis of primary research literature and development of presentation skills.

**Monday, 3:00 - 5:00 p.m., BML 137.**

### **PHARM 504a, Principles of Pharmacology. Elias Lolis.**

Lectures covering Pharmacokinetics, enzyme kinetics, drug discovery and design, molecular basis of antimicrobial, cancer, and viral therapy, immunopharmacology, asthma, allergy, and cardiovascular pharmacology

**Monday and Wednesday, 10:45 a.m. - 12:15 p.m, Giarman Room, SHM B-201.**

### **PHARM 506a, Methods in Pharmacological Research (Rotations). Elias Lolis.**

Students work in laboratories of faculty of their choice.

**HTBA.**

### **PHARM 528a, Principles of Signal Transduction. Anton Bennett.**

The regulation of intracellular signaling is of fundamental importance to the understanding of cell function and regulation. This course will introduce the broad principles of intracellular signal transduction. More detailed lectures on specific intracellular signaling pathways will be given where students will learn both the basic and most recent and cutting edge concepts of intracellular signaling. Topics covered will include regulation of signaling by protein phosphorylation, small G-proteins, G protein-coupled receptors, hormones, phospholipids, adhesion and gasses.

**Tuesday and Thursday, 10:30 - 12:00 p.m., Giarman Room, SHM B-201.**