Spring 2024 Half Courses

Referred to as "Full Term" in GSAS Academic Calendar

PRIOR TERM ENROLLMENT DEADLINES

Crimson Carts Open	Oct. 16
Course Registration Opens	Nov. 1
Course Registration Closes	Nov. 15
Check-In Open	Jan. 5
Check-in Closes	Jan. 22
Add/Drop Opens	Jan. 8
Add/Drop Closes	Jan. 29
Spring Term Begins	Jan. 22
Last day to add/drop (no fee)	Feb. 5
Registration for minimum req. credits	Mar. 4
Last day to add/enroll	Mar. 4

GSAS ACADEMIC CALENDAR

https://registrar.fas.harvard.edu/calendars

REMINDERS

You **cannot register** for courses until you **CHECK-IN** (or go to: **https://registrar.fas.harvard.edu/check-in**)

Register for **16 credits** for full-time student status and health insurance eligibility

Register by going to **https://my.harvard.edu/**

For questions, contact: **dms_courses@hms.harvard.edu**

Updated 1/5/24

BBS 230B Experimental Analytics, Design, and Platforms
Davie Van Vactor

BCMP 213 Behavioral Pharmacology
Brian Kangas

BCMP 234 Cellular Metabolism and Human Disease
Thomas Michel, Bruce Levy, D. Branch Moody, Joseph Loscalzo, Raul Mostoslavsky, Sudha Biddinger, Marcia Haigis, Paul Schmidt, Margaret Sefater Richards, Mark Puder, Lynn Bry, Erica Esrick, Lisa Henske, David E. Cohen

BCMP 236 Principles of Drug Action in People
Sara Buhrlage, Catherine I. Dubreuil

BCMP 250 Biophysical and Biochemical Mechanisms of Protein Function
Andrew Kruse, Josefina del Mármol, Phil Cole, Eric Fischer, Nicholas Polizzi

CELLBIO 201 Principles of Cell Biology
Susan Shao

CELLBIO 207/DRB 207 Development, Stem Cells, and Regeneration
Andrew Lassar, John G. Flanagan, Guillermo Garcia-Cardena, Vandana Gupta, Karl R. Koehler, Jordan Kreidberg, Sean Megason, Olivier Pourquié, Marcos Simoes-Costa

CELLBIO 211 Molecular and Systems Level Cancer Cell Biology
Jarrod Marto, Peter Sicinski, Marc Vidal

GENETIC 216 Advanced Topics in Gene Expression
Fred Winston, Scott Kennedy, Stephen Buratowski

GENETIC 228 Genetics in Medicine - From Bench to Bedside
David Sweetser

GENETIC 349 Current Tools for Gene Analysis
Neena Haider

HBTM 200 Pathology of Human Disease
Scott Lovitch

IMMUN 202 Immune and Inflammatory Diseases
Wendy Garrett

IMMUN 203 Advances in Immunology
Daniel Lingwood, Sophia Liu, Steve Harrison, Doug Kwon, Alex Shalek, Todd Allen, Charlie Evavold, Shiv Pillai, Shira Weingarten-Gabbay, Facundo Batista

IMMUN 204 Critical Readings for Immunology
Duane Wesemann

IMMUN 301 Immunology Seminar
Shiv Pillai, Lydia Lynch

MICROBI 201 Molecular Biology of the Bacterial Cell
David Rudner, Thomas Bernhardt, Simon Dove, Sophie Helaine, Lauren Essler

MICROBI 210/ OEB 290 Microbial Sciences: Chemistry, Ecology, and Evolution
Michael Gilmore

NEUROBIO 209 The Neurobiology of Disease
Susanna Mierau, Ed Kravitz, Patricia Musolino, Beth Stevens

NEUROBIO 215B The Discipline of Neuroscience
Rick Born, Rachel Wilson

NEUROBIO 240 Biological and Artificial Intelligence
Gabriel Kreiman

SHBT 202 Clinical Aspects of Speech and Hearing
Ramon Franco

SHBT 205 Neural Coding and Perception of Sound
Anne Takesian, Julie Arenberg, Bertrand Delgutte, Ev Fedorenko, John Gabrieli, Lisa Goodrich, Lauren Kreeger, Josh McDermott, Tyler Perrachione, Dan Polley, Mark Richardson, Gabe Romero

SHBT 361 Artificial Intelligence in Medicine
Mengyu Wang, Tobias Elze

VIROLOGY 201 Virology
Ben Gewurz, Aaron Schmidt

Biological & Biomedical Sciences

BBS 230B Experimental Analytics, Design, and Platforms

Davie Van Vactor

2 units. Enrollment limited 60. Instructor consent required.

NOTE: BBS 230 is a two-part course. Each course part (230A and 230B) is worth 2 credits. Complete both parts for full 4 credits.

M/T/W/TH/F, time varies and will be provided by course instructors/CF
Meeting Dates: April 29 – May 31
Mtg. Locations: Tosteson Medical Education Center (TMEC), Rm. 227

Biomedical research advances through the publication of novel results and independent verification studies upon which other scientists build new projects and discoveries. Reproducible research practices are integral to the scientific method, as they enable the acquisition of reliable data and actionable results that can be efficiently translated/applied to clinical settings. Through a series of workshop style modules, panel discussions, and TF-led peer critique sections, this course will (a) examine multiple dimensions of experimental design through the lens of rapidly evolving technologies, (b) explore practices that promote research rigor and data transparency, and (c) promote the development of skills needed to design and communicate rigorous experiments and study design.

Course Notes: BBS 230B is open for enrollment only to students who have completed BBS 230A. Students must complete the fall semester (BBS 230A) to enroll in the summer semester (BBS 230B). BBS 230A and this course, **are required for first-year BBS students.**

For enrollment questions, please email payel_ganguly@hms.harvard.edu

Course Heads: David Van Vactor, davie_vanvactor@hms.harvard.edu
Additional Instructors: TBD

Biological Chemistry & Molecular Pharmacology

BCMP 213 Behavioral Pharmacology

Brian Kangas

4 units. Enrollment limited to 16. Instructor consent required

W., 12:00pm –2:45pm
Meeting Dates: Jan 24 – April 24
Meeting Location: Cambridge campus, specific location provided by instructor

This course serves as an introduction to the behavioral pharmacology of psychoactive drugs (e.g., stimulants, cannabinoids, opioids, psychedelics, anxiolytics, antipsychotics). It is organized in a seminar format with emphasis on behavioral methodology (i.e., model and assay development) and pharmacological analysis (i.e., receptor selectivity and efficacy). Special attention is paid to the behavioral processes involved in tolerance, drug dependence, addiction, and treatment.

Recommended Prep: One year of neuroscience, psychology, or biology recommended.
Course Note: Offered jointly with the Medical School as BP 719.0.

Course Heads: Brian Kangas, bkangas@mclean.harvard.edu

BCMP 234 Cellular Metabolism and Human Disease

Thomas Michel, Bruce Levy, D. Branch Moody, Joseph Loscalzo, Raul Mostoslavsky, Sudha Biddinger, Marcia Haigis, Paul Schmidt, Margaret Sefater Richards, Mark Puder, Lynn Bry, Erica Esrick, Lisa Henske, David E. Cohen

4 units.

M/W/F, 9:00am – 10:22am
Meeting Dates: Jan 22 – May 3
Meeting Location: Longwood Campus. Room locations vary, instructor to provide additional information.

Cellular and organismal metabolism, with focus on interrelationships between key metabolic pathways and human disease states. Genetic and acquired metabolic diseases and functional consequences interactive lectures and critical reading conferences are integrated with clinical encounters.

Course Notes: Enrollment is open to all HILS graduate students with adequate preparation in cell biology and biochemistry.
Recommended Prep: For undergraduates interested in this course, a knowledge of introductory biochemistry, genetics, and cell biology is required (MCB 63 or MCB 60 or LIFESCI50, and MCB 64 or equivalent); plus one year of organic chemistry (Chem 17/27 or 20/30). Please petition the course instructor for an exemption.

Course Head: Thomas Michel, thomas_michel@hms.harvard.edu
Additional Instructors: Bruce Levy, D. Branch Moody, Joseph Loscalzo, Raul Mostoslavsky, Sudha Biddinger, Marcia Haigis, Paul Schmidt, Margaret Sefater Richards, Mark Puder, Lynn Bry, Erica Esrick, Lisa Henske, David E. Cohen
LHB Curriculum Fellow and Associate Course Director: Emmanuel J. Rivera-Rodríguez, emmanuel_riverarodriguez@hms.harvard.edu

BCMP 236 Principles of Drug Action in People

Sara Buhrlage, Catherine I. Dubreuil

4 units.

T/TH, 3:30pm-5:00pm
Meeting Dates: Jan 23 – Apr 25
Meeting Location: Tosteson Medical Education Center (TMEC), Rm. 250

This course will discuss principles of drug discovery drug modalities and drug pharmacology. In the first part of the course, fundamental aspects of receptor and enzyme targeting agents, drug mechanism, drug metabolism, pharmacokinetics and pharmacodynamics, small molecules, proteins, and nucleic acid drugs will be described. In the second part of the course, pharmacology of therapeutics that act on the cardiovascular, immunologic, and central nervous systems will be covered. The course will include frontier lectures on antiviral agents, cardiac drugs, and treatments for brain diseases and a journal club on specialized topics in drug discovery. A range of knowledgeable instructors enlisted from the Harvard Medical School faculty and pharmaceutical scientists will participate in teaching this course.

Course Heads: Sara Buhrlage, Catherine Dubreuil, catherine_dubreuil@hms.harvard.edu

BCMP 250 Biophysical and Biochemical Mechanisms of Protein Function

Andrew Kruse, Josefina del Mármol, Phil Cole, Eric Fischer, Nicholas Polizzi

4 units. Enrollment limited to 30. Instructor consent required.

T/TH, 11:00am – 12:00pm
Meeting Dates: Jan 22 – May 1
Meeting Location: Countway Library, Classroom L1-024

Biophysical and Biochemical Mechanisms of Protein Function focuses on the molecular mechanisms that underlie essential biochemical processes such as signal transduction. Major topics include biochemical thermodynamics and conformational equilibria, protein structure and folding, receptor pharmacology, allostery, and enzymatic mechanisms of signaling. The course includes both content lectures and research frontiers seminars focused on current research in biochemistry with an emphasis on signal transduction in therapeutically relevant pathways.

Recommended Prep: A foundational biochemistry course is recommended as a prerequisite (we expect students to have a solid understanding of the core concepts in biochemistry and molecular biology, including knowledge of the amino acids and their properties as well as the central dogma).

Course Head: Andrew Kruse, andrew_kruse@hms.harvard.edu, Josefina del Mármol, josefina_delmarmol@hms.harvard.edu
Additional Instructors: Phil Cole, pacole@bwh.harvard.edu, Eric Fischer, eric_fischer@hms.harvard.edu, Nicholas Polizzi, nicholasf_polizzi@dfci.harvard.edu
Curriculum Fellow: John Peters

Cell Biology

CELLBIO 201 Principles of Cell Biology

Susan Shao

4 units. Instructor consent required.

M/W/F, 10:30am – 12:00pm
Meeting dates: Jan 22 – April 26
Meeting location: Tosteson Medical Education Center (TMEC), Rm. 209

CELLBIO 201 is a graduate level course in which students examine fundamental concepts and methodologies in cell biology with faculty from the field. Through content lectures, methods lectures, student presentations, and discussion sections, students will explore a broad range of topics including: the cytoskeleton, protein folding and quality control, the ubiquitin-proteasome system, autophagy, protein translocation across membranes, vesicular trafficking, organelle biology, chromosome organization, epigenetics, cell cycle regulation, and signal transduction.
By the end of this course, students should be able to:

- Evaluate primary scientific literature from a broad range of topics in cell biology
- Identify current questions in cell biology and the evolving approaches used to address those questions
- Design appropriate experimental approaches to address hypotheses related to cell biology
- Analyze and effectively present experimental datasets produced from modern instrumentation

Course Notes: Focus on current paradigms and approaches in cell biology. The structure of this course also includes a discussion component. Any additional details about this component will be provided by the course faculty. Offered jointly with the Medical School as CB 713.0
Recommended Prep: Introductory knowledge in biochemistry, genetics, and cell biology.

Course Heads: Susan Shao
Other Instructors: Joan Brugge, Edward Chouchani, Lucas Farnung, Steven Gygi, John Hanna, Amy Lee, Brendan Manning, Danesh Moazed, David Pellman, Tom Rapoport, Radhika Subramanian, Jennifer Waters
Discussion Section Faculty: TBD
Course Administrator: Payel Ganguly

CELLBIO 207/DRB 207 Development, Stem Cells, and Regeneration

Andrew Lassar, John G. Flanagan, Guillermo Garcia-Cardena, Vandana Gupta, Karl R. Koehler, Jordan Kreidberg, Sean Megason, Olivier Pourquié, Marcos Simoes-Costa

4 units. Enrollment limited to 16. Instructor consent required.

M/W, 2:00pm - 4:00pm
Meeting Dates: Jan 22 - May 8
Meeting Location: WAB 563

This class is evenly divided between lectures and conference sessions which cover the principals that guide vertebrate development and stem cell maintenance in various renewing tissues; in addition, we discuss how these principals can be leveraged to generate cells/tissues for regenerative biology or disease modeling in vitro. Specific topics include a molecular dissection of

the signaling pathways, gene regulatory networks, and epigenetic mechanisms that control primary axis formation and regional specification, establishment of cell fate, homeotic genes and patterning, cell migration and cell-cell signaling, organoid models of nervous system development and their application, axon development and regeneration, neuromuscular development and mechanistic insights for human birth defects, skeletal muscle stem cells in aging and disease, morphogenesis of branched tubular systems, vasculogenesis, biomechanical regulation of developmental processes, skeletal patterning and development, stem cell maintenance in various renewing tissues, germ cells and pluripotency, and directed differentiation of ES and iPS cells for regeneration and disease modeling. We will discuss how state of the art technologies in iPS organoids, cell lineage labeling, genetic manipulation, and genome wide epigenomic/transcriptomic analyses can be employed to study organ development, stem cells and regeneration.

Students employ the knowledge gained by lectures and conference sessions to identify interesting new research goals in either vertebrate development, stem cell, or regenerative biology and present research proposals to achieve these goals. Thus, the goals of this course are for students to both learn about the molecular tool-kit that evolution has endowed to vertebrates (and other multicellular animals) AND to learn how to synthesize the literature to come up with their own novel research ideas, and develop a strategy to investigate their hypotheses.

Course Notes: This course is offered as CELLBIO207 and also as DRB207. Includes lectures and conference sessions in which original literature is discussed in depth. A short research proposal is required in lieu of exams. Offered jointly with the Medical School as CB 710.0
Recommended Preparation: Introductory graduate-level courses in both Molecular and Cell Biology
Course website: https://cb207.hms.harvard.edu/

Course Heads: Andrew Lassar, andrew_lassar@hms.harvard.edu, John Flanagan, flanagan@hms.harvard.edu

CELLBIO 211 Molecular and Systems Level Cancer Cell Biology

Jarrod Marto, Peter Sicinski, Marc Vidal

4 units. Enrollment limited to 32. Instructor consent required.

M/W, 1:00pm – 2:30pm
Meeting dates: Jan 22 – Apr 24
Meeting location: Longwood Campus. Room locations vary, instructor to provide additional information.

This semester long course will explore molecular basis of cancer formation through introduction of a wide range of topics that highlight foundational research and concepts, current major findings, and future directions. You will learn how cancer cells reprogram metabolism to feed their own needs, and that in over 50% of human cancers mutations are present in genes encoding chromatin-associated proteins and protein complexes. To understand the impact of cancer genomes on individual proteins, biochemical complexes, or signaling networks, you'll interrogate the functional proteome, and you'll take a step back to understand how the properties of cellular systems might be perturbed in cancer. Deep dive into cancer cells will reveal that even within the same tumor, cells can display startling differences for many features making intratumor heterogeneity a major obstacle toward understanding and treatment of cancers. You will learn about small molecule probes and how they offer a unique opportunity to understand the biological rationale for potential cancer therapeutics, how immune cells employ different cellular and molecular mechanisms to eliminate transformed cells, and you will learn about the rapid pace of cancer drug development highlighting results from recent clinical trials that have led to transformative FDA approvals. The topics are organized into eight modules and led by one faculty member. Faculty joining us this Spring are experts in the various fields and will provide you with an integrated perspective on past, current, and future approaches in cancer biology research. Modules consist of three sessions – an introductory lecture that provides an overview of the topic, a keynote lecture that talks about recent discoveries in the field, and, a group discussion that gives you the opportunity to synthesize the knowledge and think critically about the scientific questions in the field, while focusing on building and improving scientific communication skills through the practice of presentation, discussion, and peer evaluation & feedback.

Course Objectives:

- Understand foundational discoveries that led to major concepts in the field
- Describe the molecular basis of cancer formation
- Identify big open questions in the research areas around the course topics
- Synthesize and implement content knowledge while practicing your presentation skills
- Practice providing evaluation and feedback to your peers

Course Notes: Offered in alternate years with Cell Biology 212. Offered jointly with the Medical School as CB 704.0.
Recommended Prep: General knowledge of biochemistry, molecular genetics, and cell biology.

Course Heads: Jarrod Marto, Peter Sicinski, Marc Vidal
Curriculum Advisor: Jelena Patrnogic, Ph.D, jelena_patrnogic@hms.harvard.edu
Course Associate Director: Yan Geng, M.D., Ph.D, yan_geng@dfci.harvard.edu
Other Instructors: Stephanie Dougan, Naama Kanarek, Kornelia Polyak, Jun Qi, Geoff Shapiro, Zuzana Tothova

Genetics

GENETIC 216 Advanced Topics in Gene Expression

Fred Winston, Scott Kennedy, Stephen Buratowski

4 units. Enrollment limited to 16. Instructor consent required.
T., 2:00pm – 5:00pm
Meeting Dates: Jan 23 – April 23
Meeting Location: Tosteson Medical Education Center (TMEC), Rm 304

This course covers different topics in gene regulation, covering genetic, genomic, biochemical, and molecular approaches. A small number of topics are discussed in depth, using the primary literature. Topics range from prokaryotic transcription to eukaryotic development.

Course Notes: Offered jointly with the Medical School as GN 703.0.
Recommended Prep: Genetics 201 and BCMP 200 or equivalent. All students taking Genetics 216 should read and be prepared to discuss the papers for the first meeting. The readings can be downloaded from the course website.
Course Head: Fred Winston, winston@genetics.med.harvard.edu
Course Instructors: Scott Kennedy, kennedy@genetics.med.harvard.edu , Stephen Buratowski, steve_buratowski@hms.harvard.edu

GENETIC 228 Genetics in Medicine - From Bench to Bedside

David Sweetser

4 units. Enrollment limited to 45. Instructor consent required.

Fri., 2:00pm – 5:00pm
Meeting Dates: Jan 26 – Apr 19
Meeting Location: MGH, 185 Cambridge St, Simches 3rd floor, conf room 3-120

Focus on translational medicine: the application of basic genetic discoveries to human disease. Each three-hour class will focus on a specific genetic disorder and the approaches currently used to speed the transfer of knowledge from the laboratory to the clinic. Each class will include a clinical discussion, a patient presentation if appropriate, followed by lectures, a detailed discussion of recent laboratory findings and a student-led journal club. Lecturers will highlight current molecular, technological, bioinformatics and statistical approaches that are being used to advance the study of human disease. There is no exam. Students will present one paper per session in a journal club style. Attendance and active participation for the duration of all class meetings is

required. If you are unable to attend class or cannot be present for the entire session, you are expected to contact the course instructor. Two incomplete or missed sessions will result in a failing grade. Please do not sign up if you know you will have to miss 2 or more sessions. For more information visit https://ecor.mgh.harvard.edu/Default.aspx?node_id=375

Course Notes: Undergraduates wishing to enroll should contact the instructor at dsweetser@mgh.harvard.edu to request permission and give a description of their previous genetics training.

Recommended Prep: Genetics 201 or equivalent
Course Head: David Sweetser, DSWEETSER@mgh.harvard.edu

GENETIC 349 Current Tools for Gene Analysis

Neena Haider

4 units. Enrollment limited to 18. Instructor consent required.

T/TH, 1:00pm – 3:00pm
Meeting Dates: Feb 6 – April 9
Meeting Location: Tosteson Medical Education Center (TMEC), Rm. 104

The goal of this course is to apply a number of genomic tools over the course of a semester-long guided research project, learn how to utilize the complimentary statistical tools for analysis, and to discuss the strategies. Using example sequence datasets, students will analyze differential gene expression and changes. The class will explore the featured tool, related statistical methods together in an interactive manner followed by a discussion of the tools/stats as seen in published work. After taking this class students will be able to apply each online tool to their own research and will be able to identify and use new genomic computational resources to address future research directions

Course Notes: Students will need to bring a laptop to class each day.

Course Head: Neena Haider, Neena_Haider@hms.harvard.edu
Other Instructors: Kristina Holton, kmholton@g.harvard.edu

Human Biology & Translational Medicine

HBTM 200 Pathology of Human Disease

Scott Lovitch

4 units.

Lecture: T/TH 9:00am - 11:00am
Lab: TH, 11:00am - 1:00pm
Meeting Dates: Jan 30 – May 9
Meeting Location: Longwood Campus. Room locations vary, instructor to provide additional information.

This course provides a comprehensive overview of human pathology with emphasis on mechanisms of disease and modern diagnostic technologies. Topics include (1) general mechanisms of disease (inflammation, infection, immune injury, host response to foreign materials, transplantation, genetic disorders and neoplasia), (2) pathology of major organ systems, and (3) review of diagnostic tools from invasive surgical pathology to non-invasive techniques such as diagnostic imaging and molecular pathology. The objectives of this course are achieved through a set of integrated lectures and laboratories, as well as a student-driven term project leading to a formal presentation on a medical, socioeconomic, or technological issue in human pathology.

Course Notes: Enrollment may be limited.
Recommended Preparation: General biology

Course Head: Scott Lovitch, slovitch@bwh.harvard.edu

Immunology

IMMUN 202 Immune and Inflammatory Diseases

Wendy Garrett

4 units. Instructor consent required.

T/TH, 1:30pm – 3:00pm
Meeting dates: Jan 23 – Apr 23
Meeting location: Armenise, Modell 100A

IMMUN 202 builds on IMMUN 201 and explores fundamental principles of immunology in the context of immune and inflammatory diseases. Through a series of lectures and discussion, students will survey a broad range of diseases in which the immune system is essential. Topics will include not only diseases that mobilize classical immunity but also conditions to which we now know the immune systems contributes. Students will use oral (paper discussions) and written exercises (problem sets) to learn how to critically evaluate and synthesize major concepts and tools essential for the study of immunology.

Recommended Preparation: Immunology 201 or its equivalent.

Course Head: Wendy Garrett, wgarrett@hsph.harvard.edu
Additional Instructors: Information provided in syllabus
Teaching Fellows: Michael Mandanas, Keely Ji

IMMUN 203 Advances in Immunology

Daniel Lingwood

4 units. Enrollment is limited to 20. Instructor consent required.

T/TH
T: 2:30pm – 3:30pm
TH: 3:00pm – 4:00pm
Meeting Dates: Feb 13 – Apr 23
Meeting Location: Ragon Institute Auditorium

Semester long course, intended for graduate students at Harvard and MIT, jointly taught by Harvard and MIT faculty members at the Ragon Institute of MGH, MIT, and Harvard.

Recommended Prep: Students should have completed or be concurrently enrolled in a basic immunology course.

Course Heads: Daniel Lingwood, dlingwood@mgh.harvard.edu
Other Instructors: Sophia Liu, Steve Harrison, Doug Kwon, Alex Shalek, Todd Allen, Charlie Evavold, Shiv Pillai, Shira Weingarten-Gabbay, Facundo Batista

IMMUN 204 Critical Readings for Immunology

Duane Wesemann

4 units.

TH, 10:00am – 1:00pm
Meeting Dates: Jan 25 – Apr 25
Meeting Location: Armenise, Modell 100A

Original research articles from fields including immunology, biochemistry, genetics, and cell and developmental biology will be critically analyzed in an intensive small group format. Grading will be based on class participation and oral presentations.

Course Notes: Required for first-year immunology students, open to second-year immunology students. No auditors. Offered jointly with the Medical School as IM 703.0.
Course Head: Duane Wesemann, dwesemann@bwh.harvard.edu

IMMUN 301 Immunology Seminar

Shiv Pillai, Lydia Lynch

4 units. Enrollment limited to 20. Instructor consent required.

Meet and Greet: W, 12:00pm – 1:00pm
Discussion Class: W, 2:00pm – 3:30pm
301 Seminars: W, 4:00pm – 5:00pm, Wine and Cheese Reception, 5:00pm – 6:30pm
Meeting Dates: Jan 24 – Apr 24
Meeting Locations:
Meet and Greet/Discussion Class: Armenise, Modell 100A
301 Seminars: Armenise Amp. (125)

Gives students exposure to research topics in Immunology. Students prepare for the weekly seminar through readings, discussions, and preparing brief write-ups. These discussions are facilitated by members of the Committee on Immunology.

Course Note: Required for, and limited to, first-year Immunology graduate students. Attendance is required at the Meet and Greets, the discussions and the seminars.

Course Head: Shiv Pillai, pillai@helix.mgh.harvard.edu, Lydia Lynch, llynch@bwh.harvard.edu

Microbiology

MICROBI 201 Molecular Biology of the Bacterial Cell

David Rudner, Thomas Bernhardt, Simon Dove, Sophie Helaine, Lauren Essler

4 units. Enrollment limited to 30. Instructor consent required.

T/TH, 10:00am - 12:00pm
Meeting Dates: Jan 23 - Apr 25
Meeting Location: NRB 1031

This course is devoted to bacterial structure, physiology, genetics, and regulatory mechanisms. The class consists of lectures and group discussions emphasizing methods, results, and interpretations of classic and contemporary literature.

Course Notes: The Spring 2024 version of this course will include **in person** lectures and paper discussions as well as asynchronous paper reading and problem set assignments.

Course Heads: David Rudner, rudner@hms.harvard.edu,Thomas Bernhardt, thomas_bernhardt@hms.harvard.edu
Course Instructors: Simon Dove, Sophie Helaine, Lauren Essler

MICROBI 210/ OEB 290 Microbial Sciences: Chemistry, Ecology, and Evolution

Michael Gilmore

4 units. Enrollment limited to 20. Instructor consent required.

Fri., 9:45am – 11:45am
Meeting Dates: Jan 26 – Apr 19
Meeting Location: Natural History Museum / Museum of Comparative Zoology, MCZ 202, Harvard College Campus

This is an interdisciplinary graduate-level and advanced undergraduate-level course in which students explore topics in molecular microbiology, microbial diversity, host-microbe associations in health and disease, and microbially-mediated geochemistry in depth. This course will be taught by faculty from the Microbial Sciences Initiative. Topics include the origins of life, biogeochemical cycles, microbial diversity, and ecology.

Course Notes: Also offered as Organismic and Evolutionary Biology 290. Course meeting dates and location: Jan 26, 2024 - April 19, 2024, in Natural History Museum / Museum of Comparative Zoology, MCZ 202, Harvard College Campus.
Prerequisite: For graduate and advanced undergraduate students, Life Sciences 1a and 1b or their equivalent are required, or permission of instructor. MCB 60 or equivalent is recommended.

Course Head: Michael Gilmore, michael_gilmore@meei.harvard.edu
Course TA: Samantha Wellington, mirandas@broadinstitute.org

Neurobiology

NEUROBIO 209 The Neurobiology of Disease

Susanna Mierau, Ed Kravitz, Patricia Musolino, Beth Stevens

4 units. Enrollment limited to 40. Instructor consent required.

M, 5:30pm – 8:00pm
W, 3:00pm – 5:00pm
Meeting Dates: Jan 22 – April 24
Meeting Location: TBD

This highly rated course covers a major disease or disorder of the nervous system each week, including Alzheimer's disease, Parkinson's disease, stroke, autism spectrum disorder and others. Monday sessions involve patient presentations and "core" lectures describing clinical progression, pathology, and basic science underlying a major disease or disorder. On Wednesdays, students present material from original literature sources, and there is general discussion.

Course Notes Given in alternate years. For graduate students, MD and MD/PhD students, and advanced undergraduate students (juniors & seniors only).
Recommended Prep Introductory neurobiology, biochemistry, and genetics/molecular biology recommended.

Course Head: Susanna Mierau, SMIERAU@mgh.harvard.edu
Course Co-Directors: Edward Kravitz, edward_kravitz@hms.harvard.edu, Patricia Musolino, pmusolino@partners.org, Beth Stevens, beth.stevens@childrens.harvard.edu

NEUROBIO 215B The Discipline of Neuroscience

Rick Born, Rachel Wilson

4 units. Enrollment limited to 30. Instructor consent required.

T/TH, 9:00am – 12:00pm
Meeting Dates: Jan 23 – Apr 23
Meeting Location: WAB 236

This course will endow students with the broad conceptual fluency in the discipline of neuroscience required to relate genes to circuit function, metabolism to neurological disease, and cell biology to neural computations. Through a combination of lectures and discussions, students will learn to design, quantitatively analyze, and interpret experiments that address a variety of questions spanning molecular to systems neuroscience. During the first semester (NB215A), students will think critically about the fundamental units of the nervous system within the context of cellular function, electrical conduction, and chemical signaling. The second half of the course (NB215B) builds upon this foundation to focus on broadly defined "networks of neural function" as related to coordinated neural activity, the concerted execution of genetic programs, and anatomically defined structural networks. The course culminates with students writing a grant proposal in the style of the NIH NRSA.

Course Notes: Full year course. Students may not enroll for the second semester unless they have completed the first semester; however, students may elect to take just the first semester. Please note that Program in Neuroscience (PiN) students must take both semesters to fulfill the requirement.

Recommended Prep: Students must successfully complete the Fall semester of course (NEUROBIO 215A).

Course Head: Rick Born, richard_born@hms.harvard.edu, Rachel Wilson, rachel_wilson@hms.harvard.edu
Curriculum Fellow: Nicolette Frazer, nicolette_frazer@hms.harvard.edu

NEUROBIO 240 Biological and Artificial Intelligence

Gabriel Kreiman

4 units.

T, 3:00pm – 5:00pm
W Discussion: 6:00pm – 7:15pm
Meeting Dates: Jan 22 – Apr 24

Meeting Location: Cambridge campus, specific location provided by instructor

This course provides a foundational overview of the fundamental ideas in computational neuroscience and the study of Biological Intelligence. At the same time, the course will connect the study of brains to the blossoming and rapid development of ideas in Artificial Intelligence. Topics covered include the biophysics of computation, neural networks, machine learning, Bayesian models, theory of learning, deep convolutional networks, generative adversarial networks, neural coding, control and dynamics of neural activity, applications to brain-machine interfaces, connectomics, among others.

Course Notes: Jointly offered with the Faculty of Arts & Sciences as NEURO 140.
Recommended Prep: Basic knowledge of multivariate calculus, differential equations, linear algebra, elementary probability theory

Course Head: Gabriel Kreiman, Gabriel.Krieman@childrens.harvard.edu

Speech & Hearing Sciences

SHBT 202 Clinical Aspects of Speech and Hearing

Ramon Franco

4 units. Enrollment limited to 15. Instructor consent required.

M/W, 5:00pm - 7:00pm
Meeting Dates: Jan 30 – Apr 26 (specific dates may vary, details provided by instructor)
Meeting Location: Mass Eye and Ear (specific locations provided by instructor)

Clinical approach to speech and hearing disorders as practiced by physicians, audiologists, speech clinicians, and rehabilitation specialists. Includes virtual observation of patient care in clinic and operating rooms, as well as lectures, discussion groups, and laboratory experience in audiological and vestibular testing.

Course Notes: Classes to be held in person at Mass Eye and Ear unless otherwise indicated. Class meeting times may change according to physician, OR, and clinic schedules.
Recommended Prep: Anatomy of Speech and Hearing, Acoustics of Speech and Hearing, or permission of the course director.

Course Head: Ramon Franco, ramon_franco@meei.harvard.edu
Other Instructors: Dave Jung, David_Jung@meei.harvard.edu

SHBT 205 Neural Coding and Perception of Sound

Anne Takesian, Julie Arenberg, Bertrand Delgutte, Ev Fedorenko, John Gabrieli, Satrajit Ghosh, Lisa Goodrich, James Heaton, Josh McDermott, Tyler Perrachione, Dan Polley, Mark Richardson, Vallila Rohter, Kristina Simonyan

4 units. Enrollment limited to 20. Instructor consent required.

M/W/F, 9:30am – 11:30am
Meeting Dates: Jan 22 – May 11
Meeting Location: Mass Eye and Ear, 243 Charles Street, Boston, MA 02114, Sloane Conference Room & MIT Bldg 46, Room 5193

Neural structures and mechanisms mediating the detection, localization and recognition of sounds. General principles are conveyed by theme discussions of auditory masking, sound localization, musical pitch, cochlear implants, cortical plasticity and auditory scene analysis.

Course Notes: Offered jointly with MIT HST.723 and MIT 9.285
Prerequisite: NEUROBIO 200 or permission of the instructor.

Course Heads: Anne Takesian, anne_takesian@meei.harvard.edu
Course Instructors: Julie Arenberg, Bertrand Delgutte, Ev Fedorenko, John Gabrieli, Satrajit Ghosh, Lisa Goodrich, James Heaton, Josh McDermott, Tyler Perrachione, Dan Polley, Mark Richardson, Vallila Rohter, Kristina Simonyan, Anne Takesian

SHBT 361 Artificial Intelligence in Medicine

Mengyu Wang, Tobias Elze

4 units.

T., 1:00pm – 4:00pm
Meeting Dates: Jan 23 – Apr 23
Meeting Location: Schepens Eye Research Institute, 20 Staniford Street, Boston, MA 02114; Room: Second Floor Conference Room

This course offered at Schepens Eye Research Institute will serve as an introduction to artificial intelligence (AI) with an emphasis on its applications in medicine. The course will start from classical linear and non-linear regression models and then move to classical machine learning models including matrix decomposition methods, random forest, support vector machine, and traditional neural networks based on multilayer perceptron and finally dive into the latest deep neural networks such as convolutional neural networks and transformers. The class will be taught with homework in the form of two mini-projects and one final project mainly using medical

imaging data along with other medical tests and diagnostic information. We will have three special sessions as the last three classes to overview the latest developments on common medical AI modeling topics including segmentation, few-shot learning, anomaly detection, and large language models' utilities in medicine.

Course Notes: Students should be familiar with at least one programming language such as MATLAB, R or Python. The structure of this course also includes a discussion component. Any additional details about this component will be provided by the course faculty.

Course Heads: Mengyu Wang, Mengyu_Wang@meei.harvard.edu, Tobias Elze, Tobias_Elze@MEEI.HARVARD.EDU
Other Instructors: Mohammad Eslami; Saber Kazeminasab; Yan Luo; Min Shi; Yu Tian

Virology

VIROLOGY 201 Virology

Ben Gewurz, Aaron Schmidt

4 units. Enrollment limited to 20. Instructor consent required.

T/TH, 9:30am-11:00am
Meeting Dates: Jan 23 – May 2
Meeting Location: Tosteson Medical Education Center (TMEC), Rm. 338

The course focuses on the following areas of virology: (i) RNA and DNA virus replication mechanisms, (ii) innate responses to viral infection (iii) adaptive immune responses to viral infection, (iv) viral latency and reactivation, (v) inhibition of viral infection. The course will comprise lectures as well as reviewing literature that describes fundamental breakthroughs relevant to these areas. Within those areas, the class will read and discuss papers dealing with virus structure, replication, pathogenesis, evolution, emerging viruses, chronic infection, innate and adaptive immunity, anti-viral drugs/vaccines. Special emphasis will be placed on preparing students to critically evaluate the literature, formulate hypotheses and design experiments.

Course Notes: Course format will be lectures, literature-based critical reading and discussion. Prepare and defend a written research proposal. Offered jointly with the Medical School as MG 723.0.
Prerequisite: Virology 200, graduate standing and permission required.

Course Head: Ben Gewurz, bgewurz@partners.org, Aaron Schmidt, aschmidt@crystal.harvard.edu
Course Instructors: TBD