Spring 2026 Half Courses

Referred to as "Full Term" in GSAS Academic Calendar

PRIOR TERM ENROLLMENT DEADLINES

Crimson Carts Open	Oct. 22
Course Registration Opens	Nov. 5
Course Registration Closes	Nov. 19
Check-In Open	Jan. 6
Check-in Closes	Jan. 26
Add/Drop Opens	Jan. 12
Add/Drop Closes	Feb. 2
Spring Term Begins	Jan. 26
Last day to add/drop (no fee)	Feb. 9
Registration for minimum req. credits	Mar. 9
Last day to add/enroll	Mar. 9
Spring recess	Mar. 14 – Mar. 22
Last day to drop	Mar. 23

(last day to drop a course without a W/D on trans.)

GSAS ACADEMIC CALENDAR

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

REMINDERS

IMPORTANT NOTE: QC's are **SPRING 1** and **SPRING 2** courses on the calendar – important dates may vary from HALF course dates.

Prior to ADD/DROP in JANUARY: you **cannot register for or** revise existing 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 11/14/25

BCMP 213 Behavioral Pharmacology
Brian Kangas

BCMP 234 Cellular Metabolism and Human Disease
Thomas Michel

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

BCMP 250 Biophysical and Biochemical Mechanisms of Protein Function
Josefina del Mármol

BMIF 203 AIM II - Artificial Intelligence in Medicine II
Marinka Zitnik

BMIF 301 AI in Medicine Clinical Experience I
Gabriel Brat

CELLBIO 201 Principles of Cell Biology
Susan Shao, Lucas Farnung

CELLBIO 207/DRB 207 Development, Stem Cells, and Regeneration
Andrew Lassar, John G. Flanagan

CELLBIO 211 Molecular and Systems Level Cancer Cell Biology
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

HBTM 200 Pathology of Human Disease
Maria Lehtinen, Mark Fleming

IMMUN 202 Immune and Inflammatory Diseases
Wendy Garrett

IMMUN 203 Advances in Immunology
Daniel Lingwood

IMMUN 204 Critical Readings for Immunology
Duane Wesemann

IMMUN 301 Immunology Seminar
Shiv Pillai, Peter Sage

MICROBI 201 Molecular Biology of the Bacterial Cell
David Rudner, Thomas Bernhardt, Simon Dove, Sophie Helaine, Marco Jost, Deepali Ravel

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

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

NEUROBIO 212 Mathematical Tools for Neuroscience
Kanaka Rajan, Jan Drugowitsch, Gabriel Kreiman

NEUROBIO 215B The Discipline of Neuroscience
John Assad, Mark Andermann

SHBT 202 Clinical Aspects of Speech and Hearing
David Jung

SHBT 205 Speech and Hearing: From Neuroscience to Perception
Anne Takesian

SHBT 261 Artificial Intelligence in Medicine
Mengyu Wang, Tobias Elze

VIROLOGY 201 Virology
Aaron Schmidt, Benjamin Gewurz

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 26 – April 29
Meeting Location: Cambridge campus – RM TBD

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 Head: Brian Kangas, bkangas@mclean.harvard.edu

BCMP 234 Cellular Metabolism and Human Disease

Thomas Michel

4 units.

M/W/F, 9:00am – 10:30am
Meeting Dates: Jan 26 – May 5
Meeting Location: Longwood campus - instructor to provide location

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

BCMP 236 Principles of Drug Action in People

Sara Buhrlage, Catherine I. Dubreuil

4 units.

T/TH, 3:30pm-5:00pm
Meeting Dates: Jan 27 – Apr 30
Meeting Location: Longwood campus - instructor to provide location

This course will discuss principles of early 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 will be described. Selected examples of small molecule drugs, biologics, gene and cell therapies will be utilized through the course. In the second part of the course, the pharmacology of therapeutics that act on selected human physiological systems, specifically the cardiovascular, immunologic, and central nervous systems, will be covered. The course will include frontier lectures delivered by experts at Harvard and in the Biopharmaceutics industry. A range of speakers enlisted from the Harvard faculty and pharmaceutical scientists will participate in teaching throughout this course.

Course notes: Please note that all sessions will be held in person. All course materials including lecturers PowerPoint presentations will be posted on the course website. Attendance to all in class activities, discussions and journal clubs is mandatory, not attending these without an excused absence can lead to an incomplete grade for the course.

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

BCMP 250 Biophysical and Biochemical Mechanisms of Protein Function

Josefina del Mármol

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

T/TH, 11:00am – 12:00pm
Meeting Dates: Jan 27 – April 28
Meeting Location: Longwood campus - instructor to provide location

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: Josefina del Mármol, josefina_delmarmol@hms.harvard.edu
Additional Instructors: Nicholas Polizzi nicholasf_polizzi@dfci.harvard.edu, Andrew Kruse andrew_kruse@hms.harvard.edu, Stephen Blacklow stephen_blacklow@hms.harvard.edu
Curriculum Fellow: Cristina DeOliveira cristina_deoliveira@hms.harvard.edu

Biomedical Informatics

BMIF 203 AIM II - Artificial Intelligence in Medicine II

Marinka Zitnik

4 units. Instructor consent required.

W., 1:00pm – 3:00pm
Meeting Dates: Jan 28 – April 29
Meeting Location: Longwood campus - instructor to provide location

Artificial intelligence (AI) continues to transform medicine, offering cutting-edge approaches to address challenges in medical research and practice. This course covers the foundations of modern AI, including self-supervised learning, generative models, and multimodal techniques with applications to natural language processing, medical image analysis, patients' medical records, and longitudinal data. The course aims to equip students with both a technical understanding of AI techniques and the implications of these technologies, especially in terms of model and data

interpretability, integration into clinical and research workflows, human-AI interaction, and ethical considerations. Materials will be presented through lectures by faculty, readings of contemporary literature, small group research projects, and multiple practical tutorials with hands-on components. Tutorial times will be decided after polling enrolled students and based on speaker availability.

Recommended Prep: Intended primarily for graduate students with good programming skills in Python, knowledge of basic statistics and linear algebra, and practical experience with fundamental data science concepts.

Course Head: Marinka Zitnik, marinka@hms.harvard.edu

BMIF 301 AI in Medicine Clinical Experience I

Gabriel Brat

4 units. Instructor consent required.

F., 2:00pm – 5:00pm
Meeting Dates: Jan 30 – April 24
Meeting Location: Longwood campus - instructor to provide location

This course will expose students to the processes and logistics of data collection within the healthcare enterprise. Introduction lectures will explore how data is collected in the operating room, emergency department, intensive care, unit, inpatient hospital units, and ambulatory clinics. Students will have the opportunity to shadow clinicians working in the outpatient and inpatient setting.

Course Note: This course is only open to Biomedical Informatics PhD students in the AI in Medicine track.

Course Head: Gabriel Brat, Gabriel_Brat@hms.harvard.edu

Cell Biology

CELLBIO 201 Principles of Cell Biology

Susan Shao, Lucas Farnung

4 units. Instructor consent required.

M/W/F, 10:30am – 12:00pm
Meeting dates: Jan 26 – April 29
Meeting Location: Longwood campus - instructor to provide location

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.
Recommended Prep: Introductory knowledge in biochemistry, genetics, and cell biology.

Course Heads: Susan Shao, Sichen_Shao@hms.harvard.edu, Lucas Farnung, Lucas_Farnung@hms.harvard.edu
Other Instructors: Danesh Moazed, Dan Finley, Radhika Subramanian, Amy Lee
Discussion Section Faculty: Steve Gygi, Rachel Wolfson, Corey Allard, Pere Puigserver

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

Andrew Lassar, John G. Flanagan

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

M/W, 2:00pm - 4:00pm
Meeting Dates: Jan 26 – April 29
Student Research Proposal Presentation: May 13
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.
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
Other Instructors: Guillermo Garcia-Cardena, Vandana Gupta, Karl Koehler, Sean Megason, Samantha Morris, Olivier Pourquié, Marcos Simoes-Costa

CELLBIO 211 Molecular and Systems Level Cancer Cell Biology

Peter Sicinski, Marc Vidal

4 units. Enrollment limited to 32. Curriculum Advisor or Instructor consent required.

M/W, 1:00pm – 2:30pm
Meeting dates: Jan 26 – Apr 29
Meeting location: Longwood campus - instructor to provide location

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. You will understand how the properties of cellular systems might be perturbed in cancer and what computational approaches are used in cancer research and discovery. 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
Recommended Prep: General knowledge of biochemistry, molecular genetics, and cell biology.

Course Heads: Peter Sicinski, M.D, Marc Vidal, PhD
Curriculum Advisor: Jelena Patrnogić, 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, Franziska Michor, Kornelia Polyak, Jun Qi, Zuzana Tothova, Geoffrey Shapiro

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 27 – April 28
Meeting location: Longwood campus - instructor to provide location

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.

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 30 – Apr 24
Meeting Location: MGH Campus, 185 Cambridge St, Simches 3rd Floor, Conference Room 3-110

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

Human Biology & Translational Medicine

HBTM 200 Pathology of Human Disease

Maria Lehtinen, Mark Fleming

4 units.

Lecture: T/TH 9:00am - 11:00am
Lab: TH, 11:00am - 1:00pm
Meeting Dates: Jan 26 – April 28
Meeting location: Longwood campus - instructor to provide location

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: Maria Lehtinen, maria.lehtinen@childrens.harvard.edu, Mark Fleming, Mark.Fleming@childrens.harvard.edu

Immunology

IMMUN 202 Immune and Inflammatory Diseases
Wendy Garrett

4 units. Instructor consent required.

T/TH, 1:30pm – 3:30pm
Meeting dates: Jan 27 – Apr 38
Meeting location: Longwood campus - instructor to provide location

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

IMMUN 203 Advances in Immunology

Daniel Lingwood

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

T/TH
T (lecture): 2:30pm – 3:30pm
TH (journal club): 3:00pm – 4:00pm
Meeting Dates: Feb 10 – April 23
Meeting Location: The Ragon Institute of MGH, MIT and Harvard,, Seminar Rm 101, Cambridge

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

IMMUN 204 Critical Readings for Immunology

Duane Wesemann

4 units.

TH, 10:00am – 1:00pm
Meeting Dates: Jan 26 – Apr 29
Meeting location: Longwood campus - instructor to provide location

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.
Course Head: Duane Wesemann, dwesemann@bwh.harvard.edu

IMMUN 301 Immunology Seminar
Shiv Pillai, Peter Sage

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

Wednesdays
Meet and Greet: 12:00pm – 1:00pm
Discussion Class: 2:00pm – 3:30pm
301 Seminars: 4:00pm – 5:15pm
Wine and Cheese Reception: 5:15pm – 6:15pm
Meeting Dates: Jan 28 – Apr 29
Meeting Locations:
Meet and Greet/Discussion Class: Longwood campus - instructor to provide location
301 Seminars: Longwood campus - instructor to provide location

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, Peter Sage, peter_sage@hms.harvard.edu

Microbiology

MICROBI 201 Molecular Biology of the Bacterial Cell
David Rudner, Thomas Bernhardt

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

T/TH, 9:30am – 11:30am
Meeting Dates: Jan 27 – April 28
Meeting Location: NRB Rm. 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 2026 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, Marco Jost, Deepali Ravel

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

Peter Girguis

4 units.

Fri., 9:45am – 11:45am
Meeting Dates: Jan 31 – Apr 25
Meeting Location: Natural History Museum / Museum of Comparative Zoology, MCZ 202, 26 Oxford Street, Cambridge, 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.

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: Peter Girguis, pgirguis@oeb.harvard.edu

Neurobiology

NEUROBIO 209 The Neurobiology of Disease

Susanna Mierau, 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 26 – April 29
Meeting Location: Longwood campus - instructor to provide location

This highly rated course covers a major disease or disorder of the nervous system each week, including Alzheimer's disease, Parkinson's disease, ALS, 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 (prior coursework in neurobiology required).
Recommended Prep Introductory neurobiology, biochemistry, and genetics/molecular biology recommended.

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

NEUROBIO 212 Mathematical Tools for Neuroscience

Kanaka Rajan, Jan Drugowitsch, Gabriel Kreiman

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

M/W, 10:00am – 11:30am
Meeting Dates: Jan 26 – April 29
Meeting Location: Longwood campus - instructor to provide location

This course aims to equip graduate students with the fundamental quantitative skills necessary for neuroscience research and to serve as a solid foundation for further computational neuroscience classes. The course is aimed at first-, second- or third-year students in the Neuroscience PhD

program, and is open to other graduate students in the biosciences. This course will cover the basics of linear algebra, differential equations, probability/statistics, and machine learning (focusing on areas applicable to neuroscience). You will not need any math experience beyond high school calculus. Some amount of coding in Python is necessary for this class. This course will be a flipped classroom course with prerecorded lectures and students working together on problem sets & programming exercises during class time.

Recommended Preparation: There will be some programming exercises in Python so some coding experience will be necessary (email instructor for advice on how to prepare).

Course Heads: Kanaka Rajan, kanaka_rajan@hms.harvard.edu, Jan Drugowitsch, jan_drugowitsch@hms.harvard.edu, Gabriel Kreiman, Gabriel.Kreiman@childrens.harvard.edu
Additional Instructors: Caleb Weinreb

NEUROBIO 215B The Discipline of Neuroscience

John Assad, Mark Andermann

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

T/TH, 9:00am – 12:00pm
Meeting Dates: Jan 27 – Apr 28
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: John Assad, john_assad@hms.harvard.edu, Mark Andermann, manderma@bidmc.harvard.edu

Speech & Hearing Sciences

SHBT 202 Clinical Aspects of Speech and Hearing

David Jung

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

M/W, 5:00pm - 7:00pm
Meeting Dates: Jan 26 – Apr 29 (specific dates may vary, details provided by instructor)
Meeting Location: Mass Eye and Ear, Eaton Peabody Lab Room 430A (and other clinical locations at Mass Eye and Ear)

An extensive exposure to clinical approaches to speech and hearing disorders as practiced by physicians, audiologists, speech clinicians, rehabilitation specialists, pathologists, and bioengineers. The course includes a series of didactic lectures and discussion sections, as well as observations of patient care in the clinic and operating room. Clinical and surgical experience includes observations of diagnostic and therapeutic procedures in otology, laryngology, audiology, voice and speech clinic, and vestibular neurology.

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: Dave Jung, MD, PhD, David_Jung@meei.harvard.edu
Additional Faculty: Ramon Franco,MD, ramon_franco@meei.harvard.edu, Julie Arenberg, MS, PhD (julie_arenberg@meei.harvard.edu), Anand K. Bery, MD, FRCPC (abery@meei.harvard.edu), Glenn Bunting, MS, CCC-SLP (glenn_bunting@meei.harvard.edu), John Costello, MS, CCC-SLP (John.Costello@childrens.harvard.edu), Andreas H. Eckhard, MD (abery@meei.harvard.edu), Elliott Kozin, MD (Elliott_Kozin@meei.harvard.edu), Pavan Mallur, MD (pmallur@bidmc.harvard.edu), Heidi Nakajima, MD, PhD (Heidi_Nakajima@meei.harvard.edu),

Mattew Naunheim, MD, MBA (matthew_naunheim@meei.harvard.edu), Phillip Song, MD (phillip_song@meei.harvard.edu)

Shadowing (Clinical Contacts & Administrative Assistants)
Otology Clinic & OR
Dr. Elliot Kozin - Contact: Mirrella Ruiz (Mirrella_Ruiz@meei.harvard.edu)
Dr. Dunia Abdul-Aziz - Contact: Pierre-Landache Jean (pjean4@meei.harvard.edu)
Dr. David Jung - Contact: Ampey, D'Nasiah (dampey@meei.harvard.edu)
Dr. Daniel Lee - Contact: Christine Yu (christine_yu@meei.harvard.edu)
Dr. Ronald K. de Venecia - Contact: Helen Santiago (helen_santiago@meei.harvard.edu)
Dr. Alicia Quesnel - Contact: Pierre-Landache Jean (pjean4@meei.harvard.edu)
Laryngology Clinic & OR
Dr. Ramon Franco - Contact: Kellie Gentry (Kellie_Gentry@meei.harvard.edu)
Oto-Neurolgoy Clinic
Dr. Anand K. Bery - Contact: Kristi Gega (kgega@meei.harvard.edu)
Dr. Adrian Priesol - Contact: Angela Guerra (aguerra3@meei.harvard.edu)
Dr. Richard Lewis - Contact: Angela Guerra (aguerra3@meei.harvard.edu)

SHBT 205 Speech and Hearing: From Neuroscience to Perception

Anne Takesian

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

M/W/F, 9:30am – 11:30am
Meeting Dates: Jan 26 – April 29 (final lecture), May 16 (exam)
Meeting Location: Mass Eye and Ear, 430A & MIT, Room 1593 of Bldg. 46 (Brain and Cog. Sci.)

The course is focused on neural structures and mechanisms mediating the detection, localization and recognition of sounds as well as speech perception and production. General principles are conveyed by theme discussions of cellular and circuit mechanisms of perception and plasticity within the central auditory system, human auditory cortex, pitch and auditory scene analysis, language and speech.

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: Satra Ghosh, Josh McDermott, Daryush Mehta, Dan Polley

SHBT 261 Artificial Intelligence in Medicine

Mengyu Wang, Tobias Elze

4 units.

T., 1:00pm – 3:30pm
Meeting Dates: Jan 27 – Apr 28
Meeting Location: Meeting Location: Longwood campus - instructor to provide location

This course will serve as an introduction to artificial intelligence (AI), with an emphasis on its applications in medicine. It will begin with classical linear and nonlinear regression models, then progress to traditional machine learning methods, including matrix decomposition techniques, random forests, support vector machines, and multilayer perceptron-based neural networks. The course will then cover key AI topics, including convolutional neural networks, explainable AI, self-supervised foundation models, generative AI for computer vision, recurrent neural networks and transformers, multimodal large language models, and techniques for image segmentation, visual understanding, and visual grounding. Finally, there will be three special sessions covering: (1) learning with limited data and trustworthy AI; (2) AI for science, genomics, and proteomics; (3) self-driving and AI for robotics. Course assignments will include two coding mini-projects and one final coding project.

Course Notes: Students should be familiar with Python. The course will include a discussion component, with additional details to 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; Yan Luo; Minghan Li; Sung-Hoon Yoon; Kaichen Zhou; Congcong Wen; Saber Kazeminasab; Milen Raytchev; Mousa Moradi

Virology

VIROLOGY 201 Virology

Aaron Schmidt, Benjamin Gewurz

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

T/TH, 9:30am-10:50am
Meeting Dates: Jan 26 – May 7
Meeting Location: Longwood campus - instructor to provide location

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.
Prerequisite: Virology 200, graduate standing and permission required.

Course Head: Aaron Schmidt, aaron_schmidt@hms.harvard.edu, Ben Gewurz, bgewurz@bwh.harvard.edu
Other instructors: TBD