Spring 2022 Half Courses

Referred to as "Full Term" in GSAS Academic Calendar

ENROLLMENT DEADLINES

Check-in Opens	**Jan. 5**
Course Registration Opens	**Jan. 12**
Check-in DDline	**Jan. 12**
Course Registration DDline	**Jan. 20**
Last day to add/drop (no fee)	**Feb. 7**
Last day to add/enroll	**Mar. 7**
Last day to drop	**Mar. 21**

GSAS ACADEMIC CALENDAR

https://registrar.fas.harvard.edu/gsas-academic-calendar

REMINDERS

You **cannot register** for courses until you **CHECK-IN** (or go to: https://registrar.fas.harvard.edu/online-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 1/6/22

BBS 230 Qualitative & Quantitative Analysis of Biological Literature
Roberto Chiarle, Eric Greer

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

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

BCMP 250 Biophysical and Biochemical Mechanisms of Protein Function
Andrew Kruse, Stephen Blacklow, Phil Cole, Eric Fischer

CELLBIO 201 Principles of Cell Biology
Susan Shao, Daniel Finley

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

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

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, Stefani Spranger

IMMUN 204 Critical Readings for Immunology
Duane Wesemann

IMMUN 301 Immunology Seminar
Shiv Pillai, Galit Alter

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

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

MICROBI 213 Social Issues in Biology
Richard Born, David Glass, Jill Fisher, Emily Hamilton, Christine Korsgaard, Sarah Lewis, Michael Pollan

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

NEUROBIO 215B The Discipline of Neuroscience
Lisa Goodrich, Taralyn Tan, 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, Dan Polley, Bertrand Delgutte, Josh McDermott, Lisa Goodrich, Mark Richardson, Ev Fedorenko, John Gabrieli, Tyler Perrachione, Julie Arenburg, Gabe Romero, Lauren Kreeger

VIROLOGY 201 Virology
Ben Gewurz, James Cunningham, Aaron Schmidt, Joe Sodroski, Dan Kuritzkes, Sun Hur

Biological & Biomedical Sciences

BBS 230 Qualitative & Quantitative Analysis of Biological Literature

Roberto Chiarle, Eric Greer

4 units. Instructor consent required.

T., 3:00pm – 6:00pm,
TH., 4:00pm – 6:00pm
Meeting Dates:
Tuesdays: Jan 25, Feb 1, Feb 8, Feb 15, Feb 22, Mar 8, Mar 15, Mar 22, Mar 29, Apr 5
Thursdays: Jan 27, Feb 3, Feb 10, Feb 17, Feb 24, Mar 10, Mar 17, Mar 24, Mar 31, Apr 7
Meeting Locations: Tosteson Medical Education Ctr. (TMEC) – rooms vary based on dates, instructor to provide specific date and location information.

BBS 230 is an integrated literature analysis course comprised of two related components: (1) intensive faculty-led paper discussion on Tuesdays and (2) workshops with TFs to assess individual student skills in critically evaluating and reviewing the scientific literature on Thursdays.

Course Notes: This course is required for first year BBS and second year BIG students, and is open only to BBS and second year BIG students.

Course Heads: Roberto Chiarle, roberto.chiarle@childrens.harvard.edu, Eric Greer, eric.greer@childrens.harvard.edu
Additional Instructors: Meenakshi Rao, Andrew Aguirre, Scott Kennedy, Alejandro Gutierrez, Duane Wesemann, Margie Oettinger, Julie-Aurore Losman, Frank Slack, Alexander Soukas, Hans Widlund, Benjamin Kleinstiver, Joseph Italiano, Richard Sherwood, Liron Bar-Peled, Naama Kanarek, Jean E. Schaffer, John G. Clohessy, Elaine Elion, Mohammad Rashidian, Alain Charest, Dario Lemos, Zuzana Tothova, Leonora Balaj, Jason Flannick, Nada Kalaany, Evan Macosko, Kamila Naxerova, Christopher Smillie, Xu Zhou

Biological Chemistry & Molecular Pharmacology

BCMP 234 Cellular Metabolism and Human Disease

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

4 units. Instructor consent required.

M/W/F, 9:00am - 10:22am
Meeting Dates: Jan 24 – May 6
Meeting Location: Locations and rooms vary based on dates, instructor to provide specific date and location 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 limited 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: Lynn Bry, Sudha Biddinger, Erica Esrick, Marcia Haigis, Lisa Henske, Bruce Levy, Joseph Loscalzo, Joseph Majzoub, David Moody, Raul Mostoslavsky, Mark Puder, Paul Schmidt, David E. Cohen

BCMP 236 Principles of Drug Action in People

Philip Cole, Sara Buhrlage, Catherine I. Dubreuil

4 units.

T/TH, 3:30pm-5:00pm
Meeting Dates: Jan 25 – April 28
Meeting Location: Tosteson Medical Education Ctr. (TMEC) – TMEC 250 Mini Amphitheater

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: Philip Cole, Sara Buhrlage, Catherine Dubreuil,
catherine_dubreuil@hms.harvard.edu
Other Instructors: Dr. Chelsea Powell

BCMP 250 Biophysical and Biochemical Mechanisms of Protein Function

Andrew Kruse, Stephen Blacklow, Phil Cole, Eric Fischer

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

T/TH, 11:00am – 12:00pm
Meeting Dates: Jan 25 – Apr 28
Meeting Location: 125 (D) Armenise Amphitheater (on 3/24/22, TMEC 227)

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
Additional Instructors: Stephen Blacklow, stephen_blacklow@hms.harvard.edu, Phil Cole, pacole@bwh.harvard.edu, Eric Fischer, eric_fischer@hms.harvard.edu
Curriculum Fellow: John Peters

Cell Biology

CELLBIO 201 Principles of Cell Biology

Susan Shao, Dan Finley

4 units. Instructor consent required.

M/W/F, 10:30am - 12:00pm
Meeting dates: Jan 24 – April 29
Meeting location: Tosteson Medical Education Ctr. (TMEC) – rooms vary based on dates, instructor to provide specific date and location information.
Please note that rooms may change due to construction

CB201 is a graduate level course in which students examine fundamental concepts and methodologies in cell biology with expert faculty from the field. Through content lectures, methods lectures, and discussion sections, students will explore a broad range of topics including: the molecular basis of cellular organization, subcellular compartmentalization, protein trafficking, chromosome organization and epigenetics, regulated ubiquitin-proteasome pathways, cell cycle regulation, cell death, 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 co-evolving methodologies 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. Offered jointly with the Medical School as CB 713.0.
Recommended Prep: Basic knowledge in biochemistry, genetics, and cell biology.

Course Heads: Susan Shao, Dan Finley
Other Instructors: Joan Brugge, Steve Gygi, John Hanna, Amy Lee, Maofu Liao, Brendan Manning, Danesh Moazed, David Pellman, Radhika Subramanian, Jennifer Waters, David Van Vactor
Discussion Section Faculty: Spyros Artavanis-Tsakonas, Edward Chouchani, Elaine Elion, Lucas Farnung, Steve Gygi, Marcia Haigis, John Hanna, Wade Harper, Vikram Khurana, Maofu Liao, Andrea McClatchey, Pere Puigserver, Adrian Salic, David Van Vactor, Malcolm Whitman
Curriculum Fellow: Stephanie Khairallah

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

Andrew Lassar (course director), John G. Flanagan, Guillermo Garcia-Cardena, Vandana Gupta, Karl R. Koehler, Jordan Kreidberg, Jessica Lehoczky, Sean Megason, Olivier Pourquié

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

M/W, 2:00pm - 4:00pm
Meeting Dates: Jan 24 - May 11
First Meeting Location: Lectures and discussion session will take place in ARM 527; student presentations sessions will take place on zoom.

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, limb development and regeneration, 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 two 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. Offered jointly with the Medical School as CB 710.0. Includes lectures and conference sessions in which original literature is discussed in depth. Short research proposals are 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

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 24 – Apr 27
Meeting location: Tosteson Medical Education Ctr. (TMEC) – rooms vary based on dates, instructor to provide specific date and location information.

This semester long course aims to examine the molecular basis of cancer formation through the exploration of wide range of topics such as cancer epigenetics, tumor heterogeneity, cancer metabolism, system biology proteomic approaches to study cancer, immune therapy in cancer and therapeutic development. The topics are organized into eight modules and led by one faculty member. Each module consists 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 provides you with an opportunity to present and lead a discussion, think critically about the scientific questions in the field, and help you learn how to design experiments

Course Objectives:

- Describe the molecular basis of cancer formation
- Identify big open questions in the research areas around these topics
- Explain different experimental approaches and techniques used in contemporary research
- Synthesize and implement knowledge while practicing presentation skills
- Practice giving peer evaluations and critique

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 Head: Jarrod Marto, Peter Sicinski, Marc Vidal
Curriculum Fellow: 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: Naama Kanarek, Kornelia Polyak, Jun Qi, Geoff Shapiro, Ramesh Shivdasani and Kai Wucherpfennig

Genetics

GENETIC 228 Genetics in Medicine - From Bench to Bedside

David Sweetser

4 units. Enrollment limited to 25. Instructor consent required.

Fri., 2:00pm – 5:00pm
Meeting Dates: January 28 – April 22
Meeting Location: Ether Dome, MGH, 4th floor, Bulfinch Building

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: Due to social distancing constraints and room size enrollment for this course is limited to a maximum of 25. 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 15. Instructor consent required.

T/TH, 1:00pm – 3:00pm
Meeting Dates: Feb 1 – Mar 31
Meeting Location: Tosteson Medical Education Ctr. (TMEC) – TMEC 130

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 and final data presentation from published papers. 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 resources to address future research directions.

Course Notes: Students will need to bring a laptop to class each day.
Recommended Prep: Genetics 201 or with permission from the instructor.

Course Head: Neena Haider, neena_haider@meei.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: Feb 1 – May 12
Meeting Location: Tosteson Medical Education Ctr. (TMEC) – rooms vary based on dates, instructor to provide specific date and location 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. Jointly offered with HMS as HT035.0.
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 – 4:00pm
Meeting Dates: Jan 25 – May 5
Mid-Term: Mar 22
Final: May 5
Meeting Location: Modell Cntr., Room 100

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 and written exercises 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
Other Instructors: Craig D. Platt, Michael Brenner, Richard Blumberg, Deepak Rao, Leslie Kean, Roni Nowarski, Bryan Bryson, Smita Gopinath, Arlene Sharpe, Duane Wesemann, Caroline Sokol, Nora Barrett, Marcia Haigis, Lydia Lynch, Gokhan Hotamisligil, Rudolph Tanzi, Isaac Chiu, Francisco Quintana, Andrew Lichtman, Peter Libby, Kai Wucherpfennig, Stephanie Dougan, Todd M. Allen
Teaching Fellows: Peter Georgiev, Ademi Zhakyp

IMMUN 203 Advances in Immunology

Daniel Lingwood, Stefani Spranger, Shiv Pillai, Bruce Walker, Facundo Batista, Galit Alter, Harikesh Wong, Alison Ringel, Brandon Dekosky, Judy Lieberman, Duane Wesemann

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

T/TH
T: 2:30pm – 3:30pm, TH: 3:00pm – 4:00pm
Meeting Dates: 02/15, 02/17, 02/22, 02/24, 03/01, 03/03, 03/08, 03/10, 03/15, 03/17, 03/22, 03/24, 03/29, 03/31, 04/5, 04/07, 04/12, 04/14, 04/26, 04/28
Meeting Location: Ragon Institute Auditorium (lecture), Ragon 980 (journal club)

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, Stefani Spranger, spranger@mit.edu
Other Instructors: Shiv Pillai, Bruce Walker, Facundo Batista, Galit Alter, Harikesh Wong, Alison Ringel, and Brandon Dekosky

IMMUN 204 Critical Readings for Immunology

Duane Wesemann

4 units. Instructor consent required.

TH, 10:00am – 1:00pm
Meeting Dates: Jan 27 – Apr 27
Meeting Location: Modell Cntr, Room 100 and Modell 258

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, Galit Alter

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

Meet and Greet: W, 12:00pm – 1:00pm
Discussion Class: W, 2:30pm – 4:00pm
301 Seminars: W, 4:00pm – 5:00pm
Meeting Dates: Jan 26 – Apr 27
Meeting Locations:
Meet and Greet/Discussion Class: Modell Cntr, Room 100
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. All others will be evaluated for enrollment on a case by case basis. Attendance is required at the Meet and Greets, the discussions and the seminars.

Course Head: Shiv Pillai, pillai@helix.mgh.harvard.edu, Galit Alter, GALTER@mgh.harvard.edu

Microbiology

MICROBI 201 Molecular Biology of the Bacterial Cell

David Rudner, Thomas Bernhardt, Simon Dove, Sophie Helaine, Deepali Ravel

4 units.

T/TH, 10:00am - 12:00pm
Meeting Dates: Jan 25 - Apr 26
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 2022 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, simon.dove@childrens.harvard.edu, Sophie Helaine, sophie_helaine@hms.harvard.edu, Deepali Ravel, deepali_ravel@hms.harvard.edu

MICROBI 210 Microbial Sciences: Chemistry, Ecology, and Evolution

Michael Gilmore

4 units. Enrollment limited to 20.

Fri., 9:45am – 11:45am
Meeting Dates: Jan 28 – Apr 22
Meeting Location: Natural History Museum, Harvard College Campus

This is an interdisciplinary graduate-level and advanced undergraduate-level course in which students explore topics in molecular microbiology, microbial diversity, 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. Check course site for meeting dates and location.
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: Hannah Gavin, hgavin@fas.harvard.edu

MICROBI 213 Social Issues in Biology

Richard Born, David Glass, Jill Fisher, Emily Hamilton, Christine Korsgaard, Sarah Lewis

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

TH., 5:00pm - 7:00pm
Meeting Dates: Jan 27 – Apr 21

Meeting Location: Tosteson Medical Education Ctr. (TMEC) – TMEC 448 Conference Rm

The course covers historical and contemporary readings about controversial issues related to biology and the social responsibility of scientists. Building on last year's virtual course, we've expanded our course faculty to include colleagues from a variety of disciplines in far-flung geographical locations: Jill Fisher on racial inequalities in testing new pharmaceuticals; Emily Hamilton on the public perception of vaccinations; Sarah Lewis on the legacy of Louis Agassiz and the Zealy Daguerreotypes; and Christine Korsgaard on the ethics of animal experimentation. Our goal is to provide future scientists with a background for considering the ethical and social implications of biology.

Course Notes: Offered jointly with the Medical School as MG 722.0
Recommended Prep: Some background in genetics

Course Heads: Richard Born, richard_born@hms.harvard.edu, David Glass, david_glass@hms.harvard.edu

Neurobiology

NEUROBIO 209 The Neurobiology of Disease

Ed Kravitz, Patricia Musolino, Beth Stevens

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

M, 6:00pm – 8:30pm
W, 7:00pm – 9:30pm
Meeting Dates:
Mon.: Jan 24, Jan 31, Feb 7, Feb 14, Feb 28, Mar 7, Mar 21, Mar 28, Apr 4, Apr 11, Apr 18, Apr 25
Wed.: Jan 26, Feb 2, Feb 9, Feb 16, Feb 23, Mar 2, Mar 9, Mar 23, Mar 30, Apr 6, Apr 13, Apr 20, Apr 27
Meeting Location: Tosteson Medical Education Ctr. (TMEC) – TMEC 209 Mini Amphitheater

This highly rated course covers a major disease or disorder of the nervous system each week, including Alzheimer's, Huntington's and Parkinson's Diseases, Mood and 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. Offered jointly with the Medical School as NB 713.0. For advanced undergraduate, graduate students, MD and MD/PhD students.

Recommended Prep Introductory neurobiology, biochemistry, and genetics/molecular biology recommended.

Course Heads: 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

Lisa Goodrich, Taralyn Tan, Rachel Wilson

4 units. Enrollment limited to 25. Instructor consent required.

T/TH, 9:00am – 12:00pm
Meeting Dates: Jan 25 – 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 asynchronous lectures and synchronous class 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 1st semester of course (NEUROBIO 215A).

Course Heads: Lisa Goodrich, lisa_goodrich@hms.harvard.edu, Taralyn Tan, taralyn_tan@hms.harvard.edu, Rachel Wilson, rachel_wilson@hms.harvard.edu

NEUROBIO 240 Biological and Artificial Intelligence

Gabriel Kreiman

4 units. Instructor consent required.

T, 3:00pm – 5:00pm
Meeting Dates: Jan 24 – Apr 27
Meeting Location: Please reach out to instructor for location information.

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. Lectures will be taught by leading Harvard experts in the field.

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 31 – Apr 27
Meeting Location: Massachusetts Eye and Ear, ENT Conference Room

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
Teaching Fellow: Leo Zekelman, zekelman@g.harvard.edu

SHBT 205 Neural Coding and Perception of Sound

Anne Takesian, Dan Polley, Bertrand Delgutte, Josh McDermott, Lisa Goodrich, Mark Richardson, Ev Fedorenko, John Gabrieli, Tyler Perrachione, Julie Arenberg, Gabe Romero, Lauren Kreeger

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

M/W/F, 9:30am – 11:30am
Meeting Dates: Jan 24 – May 6
Meeting Location: Mass Eye and Ear Sloane Conference Room (3rd floor of MEE, 243 Charles Street) and Bldg. 46, Rm 5193 (MIT)

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.723J.
Prerequisite: NEUROBIO 200 or permission of the instructor.

Course Heads: Anne Takesian, anne_takesian@meei.harvard.edu
Course Instructors: Dan Polley, Bertrand Delgutte, Josh McDermott, Lisa Goodrich, Mark Richardson, Ev Fedorenko, John Gabrieli, Tyler Perrachione, Julie Arenburg, Gabe Romero, Lauren Kreeger
Teaching Fellow: Christine Junhui Liu

Virology

VIROLOGY 201 Virology

Ben Gewurz, Aaron Schmidt, Jim Cunningham, Joe Sodroski, Smita Gopinath, Sylvie Rouskin, Todd Allen, Jon Li, Gaurav Gaiha, Sun Hur, Sizun Jiang

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

T/TH, 9:30am-11:00am
Meeting Dates: Jan 25 – May 3
Meeting Location: Tosteson Medical Education Ctr. (TMEC) – TMEC 446 and TMEC 140. Rooms vary based on dates, instructor to provide specific date and location information.

The course focuses on the following areas of virology: (i) epigenetic regulation, (ii) RNA virus replication mechanisms, (iii) innate responses to viral infection, and (iv) 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
Course Instructors: Aaron Schmidt, Jim Cunningham and Joe Sodroski, Smita Gopinath, Sylvie Rouskin, Todd Allen, Jon Li, Gaurav Gaiha, Sun Hur, Sizun Jiang