



HARVARD

DIVISION OF MEDICAL SCIENCES

PhD Programs at Harvard Medical School

Spring 2021 Half Courses

Enrollment Deadlines

Check-in	Jan 6 – Jan 13
Registration	Jan 13 – Jan 21
Last day to add/drop (no fee)	Feb 8
Last day to add	Mar 8
Last day to drop	Mar 22

[GSAS Academic Calendar](#)



[2020-21](#)

Wellness Days

Spring Break 2021 is replaced by individual wellness days on **Feb. 5, Mar. 1, Mar. 16, Mar. 31, and Apr. 15**. Courses and related course meetings will not meet on these days. Please note that these dates are tentative and subject to change. For more information, visit <https://registrar.fas.harvard.edu/spring-2021-calendar>

Reminders

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

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

BCMP 236 Principles of Drug Action in People

Philip Cole, Sara Buhrlage, Catherine Dubreuil

BCMP 250 Biophysical and Biochemical Mechanisms of Protein Function

Andrew Kruse, Stephen Blacklow, Phil Cole, Eric Fischer

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 212 Biology of the Cancer Cell: From Molecular Mechanisms to Therapeutic Implications

Alex Toker

GENETIC 216 Advanced Topics in Gene Expression

Fred Winston, Robert Kingston, Stephen Buratowski

GENETIC 349 Current Tools for Gene Analysis

Neena Haider

Genetics 228 Genetics in Medicine - From Bench to Bedside

David Sweetser

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

MICROBI 210 Microbial Sciences: Chemistry, Ecology, and Evolution

Michael Gilmore

MICROBI 213 Social Issues in Biology

Richard Born, David Glass, Jessica Brooks, Jill Fisher, Emily Hamilton, Christine Korsgaard, Sarah Lewis, Stephen Lory, Michael Pollan, Nadine Vincenten

NEUROBIO 215B The Discipline of Neuroscience

Lisa Goodrich, Taralyn Tan, Rachel Wilson, John Assad, Sandeep Robert Datta, Michael Do, Richard Born, Jan Drugowitsch, Christopher Harvey, Mark Andermann, Beth Stevens, Dan Polley, Rosalind Segal, Lauren Orefice

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

Joshua McDermott, Daniel Polley, Bertrand Delgutte, M. Christian Brown, Anne Takesian, Yoojin Chung, Evelina Fedorenko, John Gabrieli

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.

M/W 10:30am – 12:30pm

Meeting Dates: January 25 – April 14

Meeting Locations: Online information to be provided on course page or by instructor

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

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, Eric Greer

Additional Instructors: Meenakshi Rao, Andrew Aguirre, Scott Kennedy, Alejandro Gutierrez, Duane Wesemann, Margie Oettinger, Julie-Aurore Losman, Frank Slack, Mo Motamedi, Alexander Soukas, Hans Widlund, Benjamin Kleinstiver, Radhika Subramanian, Joseph Italiano, Richard Sherwood, Liron Bar-Peled, Naama Kanarek, Jean E. Schaffer, John G. Clohessy, Elaine Elion, Mohammad Rashidian, Cristina Aguayo-Mazzucato, Alain Charest, Dario Lemos, Zuzana Tothova, Daniel Bauer

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

4 units. Enrollment is limited to all HILS graduate students with adequate preparation in cell biology and biochemistry.

M/W/F, 9:00am - 10:30am

Meeting Dates: Jan 25 - May 7

Meeting Location: Remote - via Zoom/Canvas

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

Curriculum Fellow: Alireza Edraki, alireza_edraki@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

BCMP 236 Principles of Drug Action in People

Philip Cole, Sara Buhrlage, Catherine Dubreuil

4 Units

T/TH, 3:30pm-5:00pm

Meeting Dates: First meeting Jan 26 – Last meeting May 4

Meeting Location: Virtual via Zoom

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

Head Teaching Fellow: 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, 11:00a - 12:00p

Meeting Dates: Jan 26 - Apr 29

Meeting Location: Zoom link will be available on course website

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: Madhvi Venkatesh, madhvi_venkatesh@hms.harvard.edu

Cell Biology

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, 2:00p - 4:00p

Meeting Dates: Jan 25 - May 12

First Meeting Location: Online information to be provided by Andrew.Lassar@hms.harvard.edu

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, a goal of this course is for students 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 Heads: Andrew Lassar, andrew_lassar@hms.harvard.edu, John Flanagan, flanagan@hms.harvard.edu

CELLBIO 212 Biology of the Cancer Cell: From Molecular Mechanisms to Therapeutic Implications

Alex Toker

4 units. Enrollment limited to 24. Instructor consent required.

M/W 12:30 – 2:00

Meeting Dates: Jan 25 – April 28

Meeting Location: Online information to be provided on course page or by instructor

This semester long course takes a molecular approach to examine the basis of human cancer. The main concepts that we will cover include: cancer genetics and epigenetics, tumor suppressor genes and oncogenes, signal transduction, DNA damage and repair, angiogenesis, metastasis and invasion, apoptosis, cancer stem cells, and tumor immunology and immunotherapy. Lectures will be delivered by experts in the various fields to provide an integrated perspective on past, current and future approaches in cancer biology research. Many of the lecturers are also clinical oncologists and hematologists, who will provide insight into how molecular advances are

impacting patient care now, and are likely to do so in the future. In addition, students will participate in workshops in which they will delve more deeply into the primary literature of several of these topics.

Course Notes: Given alternate years with Cell Biology 211.

Recommended Preparation: Advanced biochemistry, molecular genetics, and cell biology.

Course Head: Alex Toker, atoker@bidmc.harvard.edu

Instructors: Matthew Meyerson, William Kaelin, Huma Rana, Frank Slack, Matthew Freedman, Alan D'Andrea, Pasi Janne, Kevin Haigis, Brendan Manning, Jon Aster, Carla Kim, Matthew Vander Heiden, Loren Walensky, Bruce Zetter, Cathy Wu, Eli Van Allen, Rizwan Haq

Curriculum Fellow: Jelena Patrnoic

Genetics

GENETIC 216 Advanced Topics in Gene Expression

Fred Winston, Robert Kingston, Stephen Buratowski

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

Tues., 2:30pm - 5:30pm

Meeting Dates: Jan 26 - May 4

Meeting Location: Online information to be provided on course page or by instructor

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: BCMP 310QC has merged with Genetics 216. 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: Robert Kingston, kingston@molbio.mgh.harvard.edu, Stephen Buratowski, steve_buratowski@hms.harvard.edu

Genetics 228 Genetics in Medicine - From Bench to Bedside

David Sweetser

4 Units



Fri., 2:00pm-5:00pm

Meeting Dates: Jan 29 – Apr 23

Meeting Location: Online information to be provided on course page or by instructor

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 15. Instructor consent required.

T/TH, 10:00am - 12:00pm

Meeting Dates: Feb 2 - Apr 6

Meeting Location: Online information for this course will be provided by instructor

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

Curriculum Fellow: Kale Hartmann, kale_hartmann@hms.harvard.edu

Human Biology & Translational Medicine

HBTM 200 Pathology of Human Disease

Scott Lovitch

4 units.

Tues., 9:00am - 11:00am, Thu, 9:00am - 1:00pm

Meeting Dates: Feb 2 - May 13

Meeting Location: Online information to be provided on course page or by instructor

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

Other Instructors: Abigail Myers, Ph.D.; Aseda Tena

Immunology

IMMUN 202 Immune and Inflammatory Diseases

Wendy Garrett

4 units.

T/TH, 9:00am – 10:00am

Meeting Dates: Jan 26 – May 6

Meeting Location: Online information to be provided on course page or by instructor

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 evaluate and synthesize major concepts and tools germane to immunology's relationship to bioscience.

Course Notes: Offered jointly with the Medical School as IM 712.0.

Recommended Preparation: Immunology 201 or its equivalent.

Course Head: Wendy Garrett, wgarrett@hsph.harvard.edu

IMMUN 203 Advances in Immunology

Daniel Lingwood, Stefani Spranger, Shiv Pillai, Bruce Walker, Facundo Batista, Ulrich von Andrian, Mary Carrington, Mike Carroll, Darrell Irvine, Arup Chakraborty

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

Tues., 2:30p - 3:30p lectures

Thu., 3:00p - 4:00p discussion sections

Meeting Dates: Feb 16 – Apr 27

Meeting Location: Online information to be provided on course page or by instructor

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

IMMUN 204 Critical Readings for Immunology

Duane Wesemann

4 units.

Thu, 11am – 1:15pm

Meeting Dates: Jan 28 – Apr 22

Meeting Location: Online information to be provided on course page or by instructor

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.

Wed., Discussion Class 12:30pm - 2:00pm, Meet and Greet 2:00pm - 3:00pm

Meeting Dates: Jan 25 – Apr 28

Meeting Location: Online information to be provided on course page or by instructor

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.

Course Head: Shiv Pillai, pillai@helix.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, EST

Meeting Dates: Jan 26 - Apr 27

Meeting Location: Online information to be provided on course page or by instructor

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 2021 version of this course will include synchronous, online lectures and paper discussions as well as asynchronous paper reading and problem set assignments. Interested students with questions about accessibility and/or time zone conflicts should contact the course directors as soon as possible.

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 29 – Apr 23

Meeting Location: Online information to be provided on course page or by instructor

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 52 or equivalent is recommended.

Course Head: Michael Gilmore, michael_gilmore@meei.harvard.edu

MICROBI 213 Social Issues in Biology

Richard Born, David Glass, Jessica Brooks, Jill Fisher, Emily Hamilton, Christine Korsgaard, Sarah Lewis, Stephen Lory, Michael Pollan, Nadine Vincenten

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

Thu, 2:00pm - 4:00pm

Meeting Dates: Jan 28 – Apr 22; No classes on Apr 17

Meeting Location: Online information to be provided on course page or by instructor

This discussion course covers historical and contemporary readings about controversial issues related to biology and the social responsibility of scientists. This year we've made a virtue of the necessity to teach online, which has freed us up to enlist input from 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; Michael Pollan on the history and current use of psychedelic drugs; 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

Teaching Fellow: Jessica Brooks, jnbrooks@g.harvard.edu

Neurobiology

NEUROBIO 215B The Discipline of Neuroscience

Lisa Goodrich, Taralyn Tan, Rachel Wilson, John Assad, Sandeep Robert Datta, Michael Do, Richard Born, Jan Drugowitsch, Christopher Harvey, Mark Andermann, Beth Stevens, Dan Polley, Rosalind Segal, Lauren Orefice

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

T/TH, 10:30am -12:00pm ET

Meeting Dates: Jan 26 - April 29

Meeting Location: Online information to be provided on course page or by instructor

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

Other instructors: John Assad, Sandeep Robert Datta, Michael Do, Richard Born, Jan Drugowitsch,

Christopher Harvey, Mark Andermann, Beth Stevens, Dan Polley, Rosalind Segal, Lauren Orefice
Teaching Fellows: Andrew Landau & Alex Chen

NEUROBIO 240 Biological and Artificial Intelligence

Gabriel Kreiman

4 units.

Tues., 3:00pm – 5:00pm

Meeting Dates: Jan 26 – Apr 27

Meeting Location: Zoom information to be provided on the course website

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. Please visit the sites below for additional information:

<http://klab.tch.harvard.edu/academia/classes/BAI/bai.html> or

<https://canvas.harvard.edu/courses/84784>

Recommended Prep: Basic knowledge of multivariate calculus, differential equations, linear algebra, elementary probability theory, basic computer programming skills

Course Head: Gabriel Kreiman, Gabriel.Kreiman@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 ET

Meeting Dates: Feb 1 - Apr 28

Meeting Location: Online information to be provided on course page or 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 remotely. 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

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

SHBT 205 Neural Coding and Perception of Sound

Joshua McDermott, Daniel Polley, Bertrand Delgutte, M. Christian Brown, Anne Takesian, Julie Arenberg, Evelina Fedorenko, John Gabrielli, Tyler Perrachione

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

M/W/F, 9:30am - 11:30am

Meeting Dates: Jan 27 – Apr 26

Meeting Location: Online information to be provided on course page or by instructor

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: Joshua McDermott, jhm@mit.edu, Daniel Polley, daniel_polley@meei.harvard.edu

Course Instructors: Bertrand Delgutte, M. Christian Brown, Anne Takesian, Julie Arenberg, Evelina Fedorenko, John Gabrielli, Tyler Perrachione

Virology

VIROLOGY 201 Virology

Ben Gewurz, Aaron Schmidt, Todd Allen, Galit Alter, Joe Sodroski, Sun Hur, Smita Gopinath, Daniel Kuritzkes, Jonathan Li, Gaurav Gaiha

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



M/F, 10:30am – 12:00pm

Meeting Dates: Jan 25 – May 5

Meeting Location: Online information to be provided on course page or by instructor

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