

Quarter Courses

Fall Term 2019-2020

Classes start

Tuesday, September 3

Online check-in (registration)

Opened August 1. Please visit the [Harvard University Knowledge Center](#) website for more information.

Deadlines and holidays

Please visit the [GSAS Calendar](#) to view deadlines and holidays for the 2019-2020 academic year.

For more information

617-432-0605 or dms_courses@hms.harvard.edu

Quarter Courses

Fall Term 2019-2020

BCMP 308QC. Cell Fate Decisions in Development & Disease

Alan B. Cantor

BMIF 313QC. Computing Skills for Biomedical Sciences

Nils Gehlenborg, Ted Feldman

BMIF 315QC. Computational Statistics for Biomedical Sciences

Peter Park

CELLBIO 306QC. Teaching 100: The Theory & Science of Teaching

Johanna L. Gutlerner, Bradley Coleman

HBTM 302QC. Imaging and Microscopy Methods in Biology & Medicine

Lev Perelman

HBTM 303QC. Vision: A System & its Assessment

Russell Woods, Daejoon Alex Hwang

IMMUN 307QC. Cancer Immunology

Kai Wucherpfennig, Catherine Wu, Stephanie Dougan, Philip Kranzusch

IMMUN 315QC. Design and Discovery of Human Antibody Drugs

Wayne Marasco, Stephanie Dougan, Quan Zhu

MED-SCI 300QC. Conduct of Science

Kristin White

MED-SCI 312QC. Graduate Training in the Biomedical Sciences

Bradley Coleman, Taralyn Tan

MED-SCI 316QC. PhD Pathfinder

Joseph Arboleda

NEUROBIO 306QC. Quantitative Methods for Biologists (offered August 2019)

Michael Springer, Richard T. Born



NEUROBIO 308QC. Thinking about Data: Statistics for the Life Sciences

Richard Born

NEUROBIO 309QC. The Molecular Pathology & Current Therapies for Retinal Diseases

Dong Feng Chen, Petr Baranov, Corinna Bauer, Kinsang Cho, Joe Ciolino, Shelley Fried, Tatjana Jakobs, Lotfi Merabet, Daniel Sun

NEUROBIO 311QC. Eye, Brain & Vision: Classics in Visual Neuroscience

Richard Born, Jan Drugowitsch, Talia Konkle, Mark Andermann, Michael Do, Margaret Livingstone, Joshua Sanes, Chinfai Chen

NEUROBIO 315QC. Human Neuroanatomy & NeuropathologyMatthew Frosch, Jean Augustinack
Curriculum Fellow: Taralyn Tan**NEUROBIO 319QC. Neurobiology of Psychiatric Disease: From Bench to Bedside**

Bill Carlezon, Kerry Ressler

SHBT 301QC. Speech & Hearing Laboratory Visits

Bertrand Delgutte



Biological Chemistry & Molecular Pharmacology

BCMP 308QC. Cell Fate Decisions in Development & Disease

Alan B. Cantor

2 units. Enrollment limited to 15.

W, 1:30pm - 3:30pm

This quarter course will offer students an in-depth examination of current knowledge regarding mechanisms of cell fate decisions. It will examine these processes in the context of developmental cell plasticity, cellular reprogramming, and cancer. This will primarily be a literature-based course with examination and discussion of key studies in the field. Concepts involving the instructive role of lineage-specific transcription factors, transcription factor cross-antagonism, gene regulatory networks, multilineage priming, progenitor cell heterogeneity, pioneer factors, epigenetics, chromatin accessibility, chromatin remodeling factors, “super-enhancers,” stem cell bias, lineage identity maintenance, mitotic bookmarking, non-coding RNAs, cell polarity, asymmetric cell division, lateral inhibition, lineage plasticity, and cellular reprogramming will be explored. These ideas will be examined in the context of several different tissue systems and organisms.

Meeting Dates Sept 11 - Nov 20

Location Karp Family Research Building, Boston Children’s Hospital, 7th Floor Conference Room

Course Head Alan Cantor, alan.cantor@childrens.harvard.edu

Biomedical Informatics

BMIF 313QC. Computing Skills for Biomedical Sciences

Nils Gehlenborg, Ted Feldman

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

T, Th, 9:45am - 11:15am

This course will prepare students for advanced graduate level classes that require practical programming and data analysis skills. The main focus of this course is to familiarize students with the R programming language, the command line on Linux-based systems, high performance computing environments, and fundamental data analysis approaches. The skills taught in this course will enable students to design and implement programs for reproducible data analysis, manage file-based data sets, apply basic statistical, algorithmic, and visual approaches for data interpretation, assemble basic analysis workflows, and execute analyses on a compute cluster. Students will be working with Jupyter Notebooks, RStudio, git, and bash.

Course Notes BMIF 313QC is graded SAT/UNSAT. If a letter grade is preferred, students can cross-register on my.harvard for BMI 713.

Meeting Dates Sept 3 - Oct 17

Location Countway 403

Course Head Nils Gehlenborg, nils@hms.harvard.edu



BMIF 315QC. Computational Statistics for Biomedical Sciences

Peter Park

2 Units. Enrollment limited to 26. Instructor consent required.

T, Th 9:45am - 11:15am

This course will provide a practical introduction to statistical analysis of biological and biomedical data. Basic techniques will be covered, including descriptive statistics, elements of probability, hypothesis testing, nonparametric methods, correlation analysis, and linear regression. Emphasis will be on how to choose appropriate statistical tests, how to assess statistical significance, and how to avoid common mistakes in analysis of large datasets.

Course Notes This course is geared toward graduate students in the biological sciences, but others are welcome as auditors if space permits. Cross listed with HMS as BMI715.

Recommended Prep No previous knowledge in statistics is required, but some proficiency in R will be assumed.

Meeting Dates Oct 22 - Dec 12

Location Countway 403

Course Head Peter Park, peter_park@hms.harvard.edu

Cell Biology

CELLBIO 306QC. Teaching 100: The Theory & Science of Teaching

Bradley Coleman, Johanna L. Gutlerner

2 units. Enrollment limited to 20.

Th, 2:00pm - 4:30pm

For many graduate students and medical educators, teaching will be part of their career, whether as mentoring, formal classroom teaching, or teaching in the hospital. In addition, the theory and research evidence accumulating in the disciplines of cognitive psychology, neuroscience, and from STEM classrooms, has turned the question of “How do we best teach science and medicine?” into its own scientific discipline. The Theory and Science of Teaching focuses on understanding why certain teaching methods are effective by examining the scientific research and theoretical frameworks that support these methods. We will read and discuss foundational educational and cognitive psychology texts and primary literature, and then develop course materials that allow us to put these ideas into practice. *Make It Stick*, by Brown, Roediger, and McDaniel, is required pre-reading and should be completed before the first day of class.

Course Note The course has been designed as a companion to Genetics 302QC: Teaching 101, but neither course is a prerequisite of the other.

Meeting Dates Oct 3 - Nov 21

Location TMEC 128

Course Head Johanna Gutlerner, johanna_gutlerner@hms.harvard.edu, Bradley Coleman, bradley_coleman@hms.harvard.edu



Human Biology & Translational Medicine

HBTM 302QC. Imaging and Microscopy Methods in Biology & Medicine

Lev Perelman

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

T, 3:00pm - 5:00pm

Introduce modern imaging modalities used in biology and medicine with emphasis on modalities frequently employed in cellular and molecular biology. Overview of basic principles of light and electron microscopy and modern advanced light microscopy techniques such as confocal, light sheet, STED, multi-photon, super-resolution, and chromatin-sensitive CLASS. Discuss modality-specific molecular probes and genetic targeting in microscopy which includes optogenetics and CRISPR-based photoactivatable transcription systems.

Meeting Dates Oct 1 - Dec 3

First Meeting Location TMEC 328

Course Head Lev Perelman, lperelman@fas.harvard.edu

HBTM 303QC Vision: A System & its Assessment

Russell Woods, Daejoon Alex Hwang

2 units. Enrollment limited to 40.

W, 3:00pm - 5:00pm

This course provides an introduction to the visual system and its assessment. In general, we will consider vision as a system rather than its low-level components. Each two-hour session consists of two lectures provided by faculty with expertise in that area. Topics will include basic science and clinical topics, normal vision and abnormal vision, methods of assessment of animals and humans, clinical and laboratory measures.

First Meeting Date Sept 11

First Meeting Location 2nd floor conference room, Schepens Eye Research Institute

Course Heads Russell Woods, russell_woods@meei.harvard.edu, Daejoon Alex Hwang, alex_hwang@meei.harvard.edu



Immunology

IMMUN 307QC. Cancer Immunology

Kai Wucherpfennig, Catherine Wu, Stephanie Dougan, Philip Kranzusch, Judith Agudo

2 units. Enrollment limited to 15.

M, 4:00pm - 6:00pm

There have been many exciting recent developments in the cancer immunology field, and multiple therapeutic approaches have shown efficacy against diverse types of cancer. This course will emphasize new mechanistic insights, specifically on the following topics: mechanisms of spontaneous protective anti-tumor immunity; key effector cell populations of anti-tumor immunity; innate immune pathways in tumor immunity; inflammation and tumor microenvironment; immunosuppressive mechanisms in tumor immunity; targeting of inhibitory receptors; cancer vaccines.

Course Note Must be PhD student at Harvard or postdoctoral fellow

Meeting Dates Oct 28 - Dec 16 (no class on Nov 11)

Location Modell Center, 2nd floor conference room

Course Head Kai Wucherpfennig, kai_wucherpfennig@dfci.harvard.edu

IMMUN 315QC. Therapeutic Human Antibody Engineering

Wayne Marasco, Stephanie Dougan, Quan Zhu

2 units. Enrollment limited to 15.

T, 10:00am - 12:15pm

This quarter course will focus on all aspects of therapeutic antibody (Ab) engineering from bench to bedside with an emphasis on translational research. Short lectures will introduce the topics of the day, reviews and seminal papers will be provided. Ab discovery will include readings on in vitro microbial discovery platforms such as Ab-phagemid and Ab yeast display as well as single B cell cloning strategies. Current state of the art of human Ig locus transgenic mice will be discussed. Engineering strategies will include chimeric, humanized and human Abs, and different formats including single chain Abs (scFvs), domain Abs, BITES and Bi-specific Abs. Human Fc engineering to increase or decrease immune-mediated clearance will be discussed including glycan engineering. Manipulating engineered Ab in vivo clearance through size and FcRn interactions will be discussed. We will also discuss nanobodies, antibody drug conjugates and immunotoxins and chimeric antigen receptors. Classes will start with short didactic lectures followed by discussion of 2-3 published papers.

Course Notes Must be a MS or PhD student at Harvard or postdoctoral fellow; otherwise course director permission will be needed to enroll.

Recommended Prep Immunology 201. Background in genetics and biochemistry strongly recommended.

Meeting Dates Sept 10 - Nov 12

Location Modell 100A

Course Head Wayne Marasco, wayne_marasco@dfci.harvard.edu



Medical Sciences

MED-SCI 300QC. Conduct of Science

Kristin White

2 units.

This course is a required course for all DMS students and all who receive support from NIH training grants. The goal of this course is to inform students about the appropriate conduct of research and the many ethical and social problems that they may encounter during their research career in graduate school. The course consists of three lectures for the entire class and five highly interactive sessions with a small group of fellow students moderated by a faculty member. Some of the issues that will be discussed in this course include appropriate methods of collecting laboratory data, interactions with members of the laboratory and the mentor and issues dealing with research misconduct.

Notes All current G2 students must register for this course on their Fall Semester 2019 study cards. Specific enrollment instructions will be sent to current G2s and other eligible students in the upcoming weeks. Please contact Fola Fasawe, folaf@hms.harvard.edu, for enrollment inquiries.

Restricted to GSAS graduate students on the Longwood campus.

All lectures will begin promptly at 3:30 pm and end at 5:00 pm. Mandatory registration for students will begin at 3:00 pm.

Meeting Dates Sept 12 - Nov 21

Course Director Kristin White

Course Administrator Fola Fasawe, folaf@hms.harvard.edu

Location Armenise 125 (D) Amphitheater

Lecture One Research Integrity, Gretchen Brodnicki, JD, HMS Dean for Faculty and Research Integrity

Date/Time Thu, Sept 12, 3:30pm - 5:00 pm

Location Armenise 125 (D) Amphitheater

Lecture Two Implicit Bias, Sherri Ann Burnett-Bowie, MD, HMS Faculty Assistant Dean for Student Affairs, Assistant Director of the Office of Recruitment & Multicultural Affairs

Date/Time Thu, Oct 24, 3:30pm - 5:00 pm

Location Armenise 125 (D) Amphitheater

Lecture Three Conflict Resolution, Melissa Broderick, Ombudsperson, Harvard Medical School

Date/Time Thu, Nov 21, 3:30pm - 5:00 pm

Location Armenise 125 (D) Amphitheater



MED-SCI 312QC. Graduate TA Training in the Biomedical Sciences

Bradley Coleman, Taralyn Tan

2 units. Enrollment limited to 50. Instructor consent required.

MED-SCI 312QC is designed to be an 'on the ground' training for Longwood-based teaching assistants. The course instructs graduate student teaching assistants in the pedagogy and course management skills required to be an effective TA. The course begins with three two-hour class sessions that focus on the basics of evidence-based teaching practice and practical strategies for working with students. As the semester progresses, students use their work as TAs as the basis for continued instruction and reflection on teaching best practices and the challenges of their application in real-world settings.

Course Notes Open to any HILS graduate student serving as a Teaching Assistant in the fall semester, pending approval of the Curriculum Fellow working in their course (or by special arrangement approved by the Director of the Curriculum Fellows Program).

All students interested in registering for MED-SCI 312QC should **also** register for the *Graduate TA Training in the Biomedical Sciences* nanocourse. Any interested student may attend the first three sessions of MED-SCI 312QC and receive nanocourse credit, regardless of whether they are a current TA.

Register for the nanocourse [here](#).

Initial Course Meetings 4:00pm - 6:00pm on Wed, Aug 28; Thu, Sept 5; Tue, Sept 10

Location Contact instructor

Course Director Bradley Coleman, bradley_coleman@hms.harvard.edu



MED-SCI 316QC. PhD Pathfinder

Joseph Arboleda, Jane Riccardi

2 units. Enrollment limited to 50. Instructor consent required.

M - F, 5:00pm - 7:00pm (with an additional hour afterwards for networking)

In this course, *PhD Pathfinder*, students will learn about the many career paths available to people with advanced degrees in biomedical research including academia, biotech, patent law, science writing/publishing, consulting/business, education, and science policy/regulation.

A PhD education provides students with fundamental knowledge about the principles and practice of the scientific method and promotes development of problem-solving skills in ways that are quite useful for many different professions. Students will have the opportunity to learn from experienced professionals representing each of these paths, to learn about strategies for career development, curriculum enrichment, and networking opportunities that will make them competitive for their career of choice.

The course is open to all PhD students interested in learning about the range of career options available to biomedical PhDs. The course includes talks, didactic sessions, workshops and networking events to promote interactions between students and invited speakers. There will be a special emphasis on helping students with their own skill self-assessment to assist in career and professional development. After each session there will be a small networking reception for both the students and lecturers.

Note Students are required to attend all five sessions for course credit.

Meeting Dates Oct 21 - 25

Location TBA

Course Co-Director Joseph Arboleda, joseph_arboleda@meei.harvard.edu

Course Manager Jane Riccardi, jane_riccardi@hms.harvard.edu



Neurobiology

NEUROBIO 306QC. Quantitative Methods for Biologists

August bootcamp

Michael Springer, Richard T. Born

2 units. Enrollment limited to 80.

MWF, 10:00am - 5:00pm, T/Th, 1:00pm - 5:00pm

The goal of this camp is to introduce you to programming in the MATLAB environment and to show you the power this provides for analyzing data and for gaining intuition about the behavior of complex systems through the use of numerical simulations. Some of you, upon encountering in the previous sentence words like “programming” and “numerical simulations,” will feel the cold hand of fear grip your stomach, because you have never done any programming and, in fact, have tried to avoid math as much as possible. If so, YOU ARE PRECISELY THE PERSON WE HAD IN MIND as we were planning the course. We are aiming to help you break through this barrier of darkness and fear into the radiant sunshine of quantitative enlightenment. The true beauty of MATLAB, as we will personally demonstrate, is that it allows people who are not mathematically adept (e.g. some of the instructors of this course) to use powerful numerical methods and visualization tools to gain an understanding of concepts that are very difficult to grasp analytically.

Notes This boot camp course will meet in August. Sign up [here](#). **Please put this course on your fall term study card if you wish to receive credit for it.** Email jennie_epp@hms.harvard.edu, with enquiries.

Meeting Dates Aug 12 - Aug 23

Location MWF, Maxwell Dworkin G115, T/Th, Armenise 125 D Amphitheater (TMEC 209 on Th, Aug 15)

Course Instructor Michael Springer, Michael_Springer@hms.harvard.edu

NEUROBIO 308QC. Thinking about Data: Probability & Statistics for the Life Sciences

Richard T. Born, Brian Healy

2 units. Enrollment limited to 40.

W, 5:00pm - 7:00pm

Probability and statistics taught with an emphasis on using simulations and re-sampling methods to both analyze data and understand core statistical concepts. Prior to class, students will view online lectures from Dr. Brian Healy’s biostatistics course. In class, we will focus on MATLAB coding exercises to practice different approaches to analyzing real data sets, with an emphasis on resampling methods.

Course Notes This course will use a flipped design in which students will view video lectures from Dr. Brian Healy’s Biostatistics Certificate Course (offered through Catalyst) prior to in-class programming.

Prerequisite Students are required to take Neurobiology 306QC as a prerequisite for this course.

Meeting Dates Sept 4 - Oct 23

Location TMEC 128

Course Head Richard Born, richard_born@hms.harvard.edu

Curriculum Fellow Taralyn Tan, taralyn_tan@hms.harvard.edu



NEUROBIO 309QC. The Molecular Pathology & Current Therapies for Retinal Diseases

Dong Feng Chen, Petr Baranov, Corinna Bauer, Kinsang Cho, Joe Ciolino, Shelley Fried, Tatjana Jakobs, Lotfi Merabet, Daniel Sun

2 units. Enrollment limited to 20.

M, 3:00pm - 5:00pm

Retinal diseases are major causes of irreversible blindness. The retina, as a window to the brain, also presents an excellent model system to the study and evaluation of treatment strategies for neurodegenerative disorders in the central nervous system. A surge of progress resulting from studies in the disease mechanisms and the development of new imaging technology have led to a huge step forward in the therapies for diagnosing and treating retinal diseases and preventing blindness. This course will offer students an in-depth examination of current knowledge regarding retinal diseases, molecular pathology, and therapy, with an emphasis on recent breakthroughs and discussion of key studies in the field. The class consists of lectures and group discussions that focus on seminal papers selected from both the basic science and clinical ophthalmology, which will serve as a basis for teaching students basic concepts of ophthalmology and becoming familiar with advanced imaging tools and animal models of retinal diseases. Each session will review the landmark publications on a particular topic or disease. As the retina has long served a standard model for studying the CNS, the class will foster discussion on the implications of these studies in other disease mechanisms and therapy

Course Notes Offered in alternate years

Recommended Prep Basic anatomy of the eye

Meeting Dates Sept 9 - Dec 2

Meeting Location Schepens Eye Research Institute, 2nd-Floor Conference Rm, 20 Staniford St

Course Head Dong Feng Chen, dongfeng_chen@meei.harvard.edu

Curriculum Fellows Linda Benson



NEUROBIO 311QC. Eye, Brain & Vision: Classics in Visual Neuroscience

Richard Born, Jan Drugowitsch, Talia Konkle, Mark Andermann, Michael Do, Margaret Livingstone, Joshua Sanes, Chinfei Chen

2 units.

W, 5:00pm - 7:00pm

This course is designed to meet two needs in the visual neuroscience community at Harvard. The first is a necessary didactic component to our training grant from the National Eye Institute (“Research Training in Visual Neuroscience”); the second is for our students to read primary literature that is of foundational importance for our current understanding of the visual system. Thus, the course will consist of weekly two-hour meetings during which students engage in intense discussions with training grant faculty centering on papers that the faculty have deemed “classics” in their respective fields.

Meeting Dates Oct 30 - Dec 18

Location Goldenson 229

Course Head Richard Born, richard_born@hms.harvard.edu

NEUROBIO 315QC. Human Neuroanatomy & Neuropathology

Matthew Frosch, Jean Augustinack

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

MWF, 8:30am - 12:00pm

This course will cover human neuroanatomy in depth, with an emphasis on the functional implications of structure and medical implications of lesions. Teaching occurs through lectures, small group sessions, brain dissection and homework assignments.

Notes Restricted to Graduate Students only. This course is offered as part of NB200/HT130. Students may not co-register for both courses.

Meeting Dates Sept 23 - Nov 1

Location TMEC 209 (and HST lab areas)

Course Head Matthew Frosch, mfrosch@mgh.harvard.edu, Jean Augustinack, jean@nmr.mgh.harvard.edu

Curriculum Fellow Taralyn Tan, taralyn_tan@hms.harvard.edu



NEUROBIO 319QC. Neurobiology of Psychiatric Disease: From Bench to Bedside

Head Instructors William Carlezon, Kerry Ressler

Additional Instructors Diego Pizzagalli, Elena Chartoff, Marissa Silveri, Stephanie Maddox, Laura Germine, Joe Coyle, Dost Ongur, Christopher McDougle, Scott Lukas, Sabina Berretta

2 units.

T, 1:00pm - 3:00pm (two Th sessions, 1:00pm - 4:00pm)

To provide clinical insight and critical analysis of basic and translational science approaches necessary for students to approach psychiatric disorders as scientific problems, and thus contribute future research work with clinical relevance. Each pair of lectures presents 1) basic neuroscience approaches to the neural circuitry, cell and molecular biology underlying disease, followed by 2) clinical neuroscience, genetics, neuroimaging, etc., including case studies of the disorders.

The lectures will focus on a range of psychiatric disorders, neural systems underlying behavior, and translational approaches to novel interventions, while providing insight on disease characteristics, current, novel and translationally-informed treatments, gene vs. environmental risk factors, animal models, and gaps in knowledge across the field. There will also be laboratory-based sessions (organized visits to McLean Hospital) to demonstrate examples of basic and human laboratory approaches to the study and treatment of psychiatric illness.

Course Notes Papers will be provided in advance of each class. Draft course agenda attached.

Recommended Prep Review papers in advance.

Meeting Dates Sept 10 - Oct 15

Location Goldenson 229

Course Head Bill Carlezon, bcarlezon@mclean.harvard.edu, Kerry Ressler, kressler@mclean.harvard.edu

Speech & Hearing Bioscience Technology

SHBT 301QC. Speech & Hearing Laboratory Visits

Bertrand Delgutte

Research on topics in theoretical, experimental, clinical, or translational aspects of Speech and Hearing Sciences arranged on an individual basis with a research supervisor.

Meeting Dates TBA

Location TBA

Course Head Bertrand Delgutte, bertrand_delgutte@meei.harvard.edu

