FALL 2022 QC'S

HARVARD
DIVISION OF MEDICAL SCIENCES

Fall 2022
Quarter Courses (QC)

Referred to as "Half Term" in GSAS Academic Calendar

Fall Session 1 (Half-Term QC's): 8/31/22 – 10/14/22
Fall Session 2 (Half-Term QC's): 10/17/22 – 12/1/22

ENROLLMENT DEADLINES

Check-in Opens	**Aug. 1**
Course Registration	**Aug. 17**
Check-in Deadline	**Aug. 17**
Fall 1 Course Reg. Deadline	**Aug. 26**
Fall 1 Begins	**Aug. 31**
Fall 1 Add/Drop Deadline (no fees)	**Sept. 12**
Fall 2 Begins	**Oct. 17**
Fall 2 Course Reg. Deadline	**Oct. 31**
Fall 2 Add/Drop Deadline (no fees)	**Nov. 7**

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

Revised 7/22/22

CELLBIO 306QC Teaching 100: The Theory & Science of Teaching
Taralyn Tan

CELLBIO 313QC Fundamental Principles in Light Microscopy
Jennifer Waters

HBTM 302QC Imaging and Microscopy Methods in Biology & Medicine
Lev Perelman

IMMUN 307QC Cancer Immunology
Kai Wucherpfennig, Stephanie Dougan, Philip Kranzusch, Judith Agudo

IMMUN 315QC Therapeutic Antibody Engineering – From Bench to Bedside
Wayne Marasco

IMMUN 319QC Mechanisms and therapeutics of inflammation and resolution
Timothy Hla, Charles Serhan, Matthew Spite

IMMUN 320QC Innate immunity and viral infection of the lung. Coronaviruses, flu and lung superinfections
Ivan Zanoni

MED-SCI 300QC Responsible Conduct of Science (REQUIRED for G2 Students)
Rosalind Segal

MED-SCI 302QC Responsible Conduct of Science Refresher (REQUIRED for G6 Students)
Rosalind Segal

MED-SCI 316QC PhD Pathfinder
Edward Chouchani, Jane Riccardi

MICROBI 303QC Microbes in Literature
Dan Fraenkel

NEUROBIO 306QC Quantitative Methods for Biologists (AUGUST BOOTCAMP)
Michael Springer, Richard T. Born, Ella Batty

NEUROBIO 308QC Thinking about Data: Statistics for the Life Sciences
Richard T. Born, Brian Healy

NEUROBIO 315QC Human Neuroanatomy & Neuropathology
Matthew Frosch, Jean Augustinack

NEUROBIO 319QC Neurobiology of Psychiatric Disease: From Bench to Bedside
William Carlezon, Kerry Ressler

NEUROBIO 333QC Careers in Neuroscience
David Ginty

SHBT 301QC Introduction to Speech & Hearing Laboratories
Gwen Geleoc

Cell Biology

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

Taralyn Tan

Fall 1 QC
2 units. Enrollment limited to 20. Instructor consent required.
W
Remote section: 8:00am - 10:00am
In-person section: 3:00pm - 5:00pm
Meeting Dates: September 28 – November 16
Meeting Location: Tosteson Medical Education Center (TMEC), Rm 447

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.

Class Note: Class will meet for 2 hours of synchronous discussion and learning activities each week. The in-person section will meet Wednesdays from 3:00-5:00 in Longwood and is intended for PhD students who must take their classes in-person. The remote section will meet 8:00-10:00 over Zoom and is reserved for master's students. The content of the sections will be the same and both will share identical asynchronous learning components. This will include watching videos, reading a variety of materials, participating in discussion boards, creating sample materials, and writing learning reflections. The synchronous and asynchronous components combine to meet the course objectives and are equally important to students' learning.
Class begins September 7th with the release of the first asynchronous module, which students will complete and discuss in short, individually scheduled 1-on-1 meetings with the course instructor prior to the start of synchronous class sessions. The first synchronous class meeting is September 28th.

Course Note: The course has been designed as a companion to Genetics 302QC: Teaching 101, but neither course is a prerequisite of the other.
Recommended Prep: Make It Stick, by Brown, Roediger and McDaniel is required pre-reading and should be completed before the first day of class on September 28th. A required asynchronous 'module 0' will be released on Canvas, September 7th.

Course Head: Taralyn Tan, Taralyn_Tan@hms.harvard.edu

CELLBIO 313QC Fundamental Principles in Light Microscopy
Jennifer Waters

Fall 2 QC
2 units. Enrollment limited to 12. Instructor consent required.
T/TH, 10:00am – 12:00pm

Meeting Dates: October 18 – December 2
Meeting Location: Tosteson Medical Education Center (TMEC), Rm 448

Light microscopy plays a critical role in biological and biomedical discovery. Modern light microscopy applications often require quantitative measurements and the use of advanced imaging modalities (e.g., confocal, light sheet and super-resolution microscopy). To understand and properly use these applications and modalities, it is necessary to master the fundamental principles that underlie all light microscopy applications and modalities. These include optical components, resolution, photon detection, optical and digital image formation, and signal-to-noise ratio. The course will include both lectures and hands-on exercises, including building a simple microscope and the use of online simulators.

Course Head: Jennifer Waters, jennifer_waters@hms.harvard.edu
Other Instructors: Anna Jost, Anna_Jost@hms.harvard.edu

Human Biology & Translational Medicine

HBTM 302QC Imaging and Microscopy Methods in Biology & Medicine
Lev Perelman

Fall 1 QC
2 units. Enrollment limited to 15. Instructor consent required.
TH, 3:00pm - 5:00pm

Meeting Dates: September 15 – December 1
Meeting Location: Tosteson Medical Education Center (TMEC), Rm 333

This quarter course will introduce students to modern imaging modalities used in biology and medicine, with emphasis on modalities most frequently employed in cellular and molecular biology. The course will offer an overview of the basic principles of light and electron microscopy and explain their resolution limits and sources of contrast. We will discuss modality-specific functionally relevant fluorescence molecular probes which can be used for live cell imaging. The course will provide a detailed review and theory of operation of modern advanced light microscopy techniques such as confocal, line-scanning, light sheet, STED, light scattering, multi-photon and superresolution microscopy. We will then discuss Raman and light scattering spectroscopy methods for monitoring induced pluripotent stem cell differentiation, genetic targeting in microscopy and CRISPR-based photoactivatable transcription systems and basic concepts of optogenetics. We will review specific optogenetic actuators and sensors, modern light delivery techniques and various applications from investigating brain functions to cardiac optogenetics. We will also offer an overview of medical imaging techniques, such as ultrasound, X-ray CT, MRI, PET/SPECT, and ultrasound imaging, along with emerging optical imaging and spectroscopy methods. Lectures will be supplemented by visual demonstrations of the microscopy systems and hands-on laboratory work and discussions of the operation principles of those systems.

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

Immunology

IMMUN 307QC Cancer Immunology

Kai Wucherpfennig, Stephanie Dougan, Philip Kranzusch, Judith Agudo

Fall 2 QC
2 units. Enrollment limited to 20. Instructor consent required.
M, 4:00pm - 6:00pm
Meeting Dates: October 17 – November 28 (7 sessions)
Meeting Location: Modell, 100A

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

Course Head: Kai Wucherpfennig, kai_wucherpfennig@dfci.harvard.edu
Other Instructors: Dougan, Stephanie, Kranzusch, Philip, Agudo, Judith

IMMUN 315QC Therapeutic Antibody Engineering – From Bench to Bedside

Wayne Marasco

Fall 1 QC
2 units. Enrollment limited to 15. Instructor consent required.
T, 10:00am - 12:00pm
Meeting Dates: September 13 – November 15
Meeting Location: Modell, 100A

This quarter course will focus on all aspects of therapeutic antibody (Ab) engineering from bench to bedside with an emphasis on translational research. Each class will focus on a different aspect of Ab engineering and will start with short didactic lectures followed by discussion of 2-3 seminal papers that are assigned readings. Students are expected to present assigned papers and lead discussions. Ab discovery will include readings on generation of diverse Ab repertoires, 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 and gene-editing strategies 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. Finally, the necessary steps to move from bench to bedside will be discussed. Lots to learn, it's good stuff!

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.

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

IMMUN 319QC Mechanisms and therapeutics of inflammation and resolution

Timothy Hla, Charles Serhan, Matthew Spite

Fall 1 QC
2 units
TH, 10:00am – 12:00pm
Meeting Dates: October 6 – December 1
Meeting Location: Modell, 100A

Even though physiological inflammation undergoes active resolution processes to return to normal homeostasis, abnormalities in specific mechanistic processes involving immune, vascular and parenchymal cells lead to many diseases ranging from asthma, fibrosis, cancer, autoimmunity to cardiovascular diseases. This course will focus on multicellular interaction networks, lipid mediators and signaling mechanisms in inflammatory and resolutive pathobiology. Topics such as pathogenetic mechanisms, mediators, Omics strategies, microbiome/ host interactions and cellular heterogeneity will be covered. Discrete mediator networks, namely, eicosanoids, SPMs, S1P, and LPA that are therapeutically tractable and used to treat diseases will be highlighted. In addition, development of novel therapeutics to control inflammatory and resolution pathology will be discussed.

Course Head: Timothy Hla, Timothy.Hla@childrens.harvard.edu
Other Instructors: Charles Serhan, Matthew Spite

IMMUN 320QC Innate immunity and viral infection of the lung. COVID-19, flu, and lung superinfections

Ivan Zanoni

Fall 2 QC
2 units
T, 9:00am – 10:00am
Meeting Dates: October 18 – November 29
Meeting Location: Modell, 100A

The course will focus on the innate immune response elicited in the lung in response to viral infections. Particular focus will be given to RNA viral infections such as coronaviruses and influenza viruses. The role of innate immune cells, interferons, and other immune mediators in resolving and/or aggravating the viral infection will be discussed. Also, how an initial response against the virus facilitates the development of secondary bacterial superinfections will be

analyzed. Lectures will be regularly followed by discussion in class of original research articles that shaped our understanding of the inflammatory response driven by lung viral infections.

Course Notes: Basic knowledge of immunology is expected in order to follow the content of this course.

Course Head: Ivan Zanoni, Ivan.Zanoni@childrens.harvard.edu

Medical Sciences

MED-SCI 300QC Responsible Conduct of Science (REQUIRED for G2 students)

Rosalind Segal

2 units
Section Meeting Dates and Locations: To be determined by specific section leaders
Lecture Dates and Locations: See canvas page

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 several 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 experimental design and practices, conflict of interest, research misconduct, interactions with members of the laboratory and the mentor, and the ethical role of the scientist in society.

Course Notes: All current G2 students must register for this course on their Fall Semester study cards. Specific enrollment instructions will be sent to current G2s and other eligible students prior to the first day of class. Please contact Bethany_Krevat@hms.harvard.edu, for enrollment inquiries. **Restricted to HILS graduate students within programs on the Longwood campus.**

Course Head: Rosalind Segal, Rosalind_Segal@dfci.harvard.edu
Course Administrator: Bethany Krevat, Bethany_Krevat@hms.harvard.edu

MED-SCI 302QC Responsible Conduct of Science Refresher (REQUIRED for G6 students)

Rosalind Segal

2 units
Section Meeting Dates and Locations: To be determined by specific section leaders
Lecture Dates and Locations: See canvas page

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 several 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 experimental design and practices, conflict of interest, research misconduct, interactions with members of the laboratory and the mentor, and the ethical role of the scientist in society.

Course Notes: All current G6 students must register for this course on their Fall Semester study cards. Specific enrollment instructions will be sent to current G6s and other eligible students prior to the first day of class. Please contact Bethany_Krevat@hms.harvard.edu, for enrollment inquiries. **Restricted to HILS graduate students within programs on the Longwood campus.**

Course Head: Rosalind Segal, Rosalind_Segal@dfci.harvard.edu
Course Administrator: Bethany Krevat, Bethany_Krevat@hms.harvard.edu

MED-SCI 316QC PhD Pathfinder

Edward Chouchani, Jane Riccardi

Fall 2 QC
2 units. Enrollment limited to 50. Instructor consent required.
M - F, 5:00pm - 7:00pm (with an additional hour afterwards for networking)
Meeting Dates: October 17 – October 21
Meeting Location: Modell 100A

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.

Students will also learn how to find opportunities on and off campus to take the next step in their career plans.

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.

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

Course Director: Edward Chouchani, Edward_chouchani@hms.harvard.edu
Course Manager: Jane Riccardi, jane_riccardi@hms.harvard.edu

Microbiology

MICROBI 303QC Microbes in Literature

Dan Fraenkel

Fall 2 QC
2 units. Enrollment limited to 6. Instructor consent required.
T, 4:00pm – 6:00pm
Meeting Dates: October 4 – November 15
Meeting Locations: HIM 1051

Reading and discussion of fiction or narratives which indirectly or directly refer to microbiology. Choices of books will reflect literary merit, historical or cultural interest, and appropriateness of the science for assessment in hindsight. Together they, and perhaps a second series to follow, will offer a biased history of the discipline. The format will be a weekly two-hour session based

on the reading, with listing in advance of possible matters to discuss and of references. The main requirements are interest and active participation

Course Notes: Most of the books are available used from Amazon. Please reach out to the instructor, dan_fraenkel@hms.harvard.edu, for the syllabus which includes specific books for discussion.
Recommended Prep: BCMP 200 or equivalent

Course Instructors: Dan Fraenkel, Dan_Fraenkel@hms.harvard.edu

Neurobiology

NEUROBIO 306QC Quantitative Methods for Biologists (August bootcamp)

Michael Springer, Richard T. Born, Ella Batty

Fall 1 QC
2 units. Enrollment limited to 80. Instructor consent required.
M/W/F, 10:00am-4:00pm (one-hour break from 2pm-3pm) EST
T/Th, 2:00pm-4:00pm (drop-in/homework) EST
Meeting Dates: August 8 – August 19
Meeting Locations:
Week of August 8: MaxwellDworkin G115 Robert and Naida Lessin Forum
Week of August 15: Tosteson Medical Education Center (TMEC), Rm 227

The goal of this virtual camp is to introduce you to programming in the PYTHON 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 PYTHON, 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.

Course Notes: The camp is primarily designed for those of you with no prior programming experience. If you fit this description, you should definitely plan to take the course. It is critical to be familiar with a scientific programming language with which to improve your quantitative literacy throughout graduate school.

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.

Course Instructors: Michael Springer, Michael_Springer@hms.harvard.edu, Rick Born, richard_born@hms.harvard.edu, Ella Batty, Eleanor_Batty@hms.harvard.edu

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

Richard T. Born, Brian Healy

Fall 1 QC
2 units
W, 5:00pm - 7:00pm
Meeting Dates: August 31 – October 19
Meeting Location: Tosteson Medical Education Center (TMEC), Learning Studio 128

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 coding exercises to practice different approaches to analyzing real data sets, with an emphasis on resampling methods. Coding exercises may be carried out using either Python or MATLAB.

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 have some experience in programming in either Python or MATLAB. Neurobiology 306QC can fulfill this requirement.

Course Head: Richard Born, richard_born@hms.harvard.edu
Other Instructor: Brian Healy

NEUROBIO 315QC Human Neuroanatomy & Neuropathology

Matthew Frosch, Jean Augustinack

Fall 1 QC
2 units. Enrollment limited to 20. Instructor consent required.
M/W/F, 8:30am – 12:00pm
Meeting Dates: September 26 – October 28
Meeting Location: TMEC 209/HST lab in TMEC

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.

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

Course Heads: Matthew Frosch, mfrosch@mgh.harvard.edu, Jean Augustinack, jaugustinack@mgh.harvard.edu

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

William Carlezon, Kerry Ressler

Fall 1 QC
2 units
T/TH, 1:00pm - 3:00pm (**two TH sessions at McLean, 1:00pm - 4:00pm**)
Meeting Dates: September 6 – October 11
Meeting Location: Goldenson Bldg., Rm 422 or Tosteson Medical Education Ctr (TMEC), Rm 104

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.

This course intends to provide students with:

- a current understanding of the neurobiology of a range of psychiatric diseases
- insight into the clinical information and therapeutic needs driving basic science
- hypotheses on disease pathophysiology
- an ability to critically apply translational neurobiology concepts to basic science work
- an appreciation for evolving priorities at major (federal) granting agencies
- a strong foundation for performing future scientific work with clinical relevance

Course Notes: Review papers of advanced readings will be provided in advance. Classes will be held on the Longwood Campus, with two classes held at McLean Hospital.
Recommended Prep: Review papers in advance.

Course Heads: Bill Carlezon, bcarlezon@mclean.harvard.edu, Kerry Ressler, kressler@mclean.harvard.edu
Additional Instructors: Diego Pizzagalli, Elena Chartoff, Marissa Silveri, Stephanie Maddox, Laura Germine, Joe Coyle, Dost Ongur, Christopher McDougle, Scott Lukas, Sabina Berretta

NEUROBIO 333QC Careers in Neuroscience

David Ginty

Fall 1 QC
2 units. Enrollment limited to 25. Instructor consent required.
Wed., 5:00pm – 6:30pm
Meeting dates: September 7 – December 14
Meeting location: WAB 236

This course is intended to provide PiN PhD candidates with a structured introduction to career skills that enable success after the completion of the PhD, and is directed to those considering both academic and non-academic paths. There will be ten sessions in total, and each session will feature one or more invited discussion leaders who can relate the merits and challenges of particular career paths and the skills required to be successful.

Class Notes: The course meets in WAB 236 from 5:00pm to 6:30pm, beginning September 7, and continues every other Wednesday, though meeting dates may change subject to speaker availability.

Course Head: David Ginty, david_ginty@hms.harvard.edu
Teaching Assistant: Aniqa Tasnim, atasnim@g.harvard.edu

Speech & Hearing Bioscience Technology

SHBT 301QC Introduction to Speech & Hearing Laboratories

Gwen Geleoc

2 units
Meeting Dates: Contact instructor
Meeting Location: Contact instructor

Short research presentations by faculty in the Speech and Hearing Bioscience and Technology to help students select a laboratory for research rotations. Some meetings include an on-site laboratory visit.

Course Head: Gwen Geleoc, Gwenaelle.Geleoc@childrens.harvard.edu