

Division of Medical Sciences  
Ph.D. Programs at Harvard Medical School

# First Meeting of Quarter Courses Spring Term 2018-2019

**Classes Start: Monday, January 28, 2019**

**Online Check-In:** Wednesday, January 23, 2019 – Monday, January 28, 2019  
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 18-19 academic year

***For information:*** Call **617-432-4134** or email **[dms\\_courses@hms.harvard.edu](mailto:dms_courses@hms.harvard.edu)**

DIVISION OF MEDICAL SCIENCES  
Ph.D. Programs at Harvard Medical School  
2018-2019 Spring Term Quarter Course Offerings

**BCMP 305QC Seminars in Molecular and Mechanistic Biology**  
Madhvi Venkatesh

**Cell Biology 302QC Advanced Experimental Design for Biologists**  
Enrollment Capacity: Limited to 24

Randall King and David Glass

**Cell Biology 304QC Introduction to Human Gross Anatomy**

Enrollment: Limited to 24

Gerald Greenhouse, Everett Anderson, Mohini Lutchman and Giorgio Giatsidis

**Cell Biology 308QC Introduction to Histology for Graduate Students**

Enrollment: Limited to 11

Gerald Greenhouse and Everett Anderson

**Genetic 302QC Teaching 101: Bringing Effective Teaching Practices to your Classroom**

Enrollment: Limited to 12

Rachel Wright and Gavin Porter

**Genetic 303QC Current Tools for Gene Analysis**

Enrollment: Limited to 18

Neena Haider

Curriculum Fellow: Rachel Wright

**HBTM 305QC Molecular Bases of Eye Disease**

Darlene Dartt and Magali Saint-Geniez

Course Coordinator: Bridget Boles

**HBMT 308QC Experimental Design and Analysis of Eye and Vision Studies**

Russell Woods, Lotfi Merabet, Eric YinShan Ng, Christopher Bennett, Magali Saint-Geniez, Matthew Bronstad, Daniel Sun, Corinna Bauer, Alex Bowers and Tobias Elze

**Immunology 301QC Autoimmunity**

Francisco Quintana

**Immunology 302QC Clinical Sessions**

Rachael Clark

**Immunology 306QC Systems Immunology**

Christophe Benoist and Nir Hacohen

**Immunology 317QC Strategies to Achieve Durable Anti-Microbial Host Defense**

Wayne Marasco and Quan Zhu

**Immunology 305QC Neuro-Immunology Development, Regeneration and Disease** Isaac

Chiu, Beth Stevens and Michael Carroll

**Medical Sciences 312QC Graduate TA Training in the Biomedical Sciences**

Bradley Coleman, Jason Heustis and Diane Lam

**Microbiology 360QC The Human Microbiome: Comprehensive experimental design and methodologies**

Aleksandar Kostic and Abigail Sloan Devlin

## Biological Chemistry and Molecular Pharmacology

### **BCMP 305QC Seminars in Molecular and Mechanistic Biology**

*Madhvi Venkatesh*

2 Units. Enrollment: limited to students part of the Molecular Mechanistic Biology Program

Mon 5:00 – 6:00pm

Seminars in Molecular Mechanistic Biology is a series of student work-in-progress talks that meets approximately once a month during the academic year. Each presentation will be attended by two faculty members (neither of whom are the presenting student's dissertation advisor) and students will receive feedback from both the faculty and the other students in the Molecular Mechanistic Biology (MMB) program. The peer-to-peer structure of this course (which is only open to students in MMB) should build community and a sense of belonging to the program. It will also help students develop a deeper understanding of the study of molecular mechanisms outside of their own labs and build relationships with faculty

Course Notes: Registration for this class is limited to students who are a part of the Molecular Mechanistic Biology program. Students should contact Madhvi Venkatesh ([madhvi\\_venkatesh@hms.harvard.edu](mailto:madhvi_venkatesh@hms.harvard.edu)) regarding enrollment

#### **Spring 2019**

**First Meeting Date:** Monday, January 21, 2019

**Final Meeting Date:** Monday, May 6, 2019

**Location:** Students will be contacted directly with a room

**Course Head:** Madhvi Venkatesh, [Madhvi\\_Venkatesh@hms.harvard.edu](mailto:Madhvi_Venkatesh@hms.harvard.edu)

## Cell Biology

### **Cell Biology 302QC Advances Experimental Design for Biologists**

*Randy King and David Glass*

Units 2

MW 4:00 – 6:00

This course will focus on both the theory and practice of experimental design. The emphasis is on project planning and vetting, individual experimental design, and trouble-shooting. Special focus will be placed on methods to avoid experimental bias, and potential sources of inappropriate interpretation. Also the importance of system validation is especially emphasized.

#### **Spring 2019**

**First Meeting Date:** Monday, January 28, 2019

**Final Meeting Date:** Wednesday, March 6, 2019

**Location:** TMEC L-007

**Course Director:** Randy King, randy\_king@hms.harvard.edu

### **Cell Biology 304QC Introduction to Human Gross Anatomy**

*Gerald Greenhouse, Everett Anderson, Mohini Lutchman and Giorgio Giatsidis*

Units 2 Enrollment: Limited to 24

MWF 12:00 – 7:00

Lectures, laboratory dissections, and prosections will provide students an opportunity to explore the gross structure and function of the human body. The course will provide a foundation for the student to acquire practical skills in recognizing, dissecting, and differentiating key anatomical structures. Structure/function relationships will be emphasized and some foundation will be provided for understanding the anatomic basis of diseases. Each of the 13 sessions will include a lecture, 3 hours of dissection, and an evening guest lecturer on clinical or research aspects related to the dissections (supper provided).

Notes: Open to graduate, undergraduate students, postdoctoral fellows and research assistants. Students **must** sign up during the Spring semester sign up period.

#### **Spring 2019**

**First Meeting Date:** Monday, June 24, 2019

**Final Meeting Date:** Wednesday, July 24, 2019

**Location:** TMEC 447

**Course Director:** Gerald Greenhouse gerald\_greenhouse@hms.harvard.edu

**Cell Biology 308QC Introduction to Histology for Graduate Students**

*Gerald Greenhouse and Everett Anderson*

Units 2 Enrollment: Limited to 11

TR 12:00 – 4:00

Histology—the study of structure and how structure relates to function, in cells and tissues. The class will include a session on each of the major tissue types—epithelium, connective, muscle, and nerve. This will be followed by sessions during which organ systems will be studied. Each session will include an introductory lecture followed by shared observation of slides using a 12-headed light microscope. Pathology correlates will be included when possible.

Notes: This course is offered usually during the month of June or July each year. Undergraduates may enroll. Students **must** sign up during the Spring semester sign up period.

Spring 2019

First Meeting Date: Tuesday, June 20, 2019

Final Meeting Date: Thursday, July 25, 2019

Location: TMEC 132

Course Director: Gerald Greenhouse [gerald\\_greenhouse@hms.harvard.edu](mailto:gerald_greenhouse@hms.harvard.edu)

## Genetics

### **Genetic 302QC Teaching 101: Bringing Effective Teaching Practices to your Classroom** *Rachel Wright and Gavin Porter*

2 units Enrollment: Limited to 12

T 2:00 – 4:00

A course to develop the skills of effective teaching. Primary focus is hands-on experience with objective-oriented lesson planning and execution, with emphasis on active learning techniques and how they can be applied in both large and small enrollment classes.

#### **Spring 2019**

**First Meeting Date:** Tuesday, February 26, 2019

**Final Meeting Date:** Tuesday, April 30, 2019

**Location:** TMEC 445

**Course Head:** Rachel Wright, [Rachel\\_Wright@hms.harvard.edu](mailto:Rachel_Wright@hms.harvard.edu)

#### **Course Learning Objectives**

- Students will learn to plan lessons with clear goals and objectives.
- Students will distinguish between active and passive learning techniques and create active in-class activities that support their learning objectives.
- Students will become comfortable presenting material to students and gain confidence facilitating learning activities and discussions.

## **Genetic 303QC Current Tolls for Gene Analysis**

*Neena Haider*

2 Units Enrollment: Limited to 15

Th 10:00am – 12:00pm

The goal of this course is to explore a number of the current online tools to analyze genes, gene function, pathways, DNA, RNA, and protein analysis. Each class we will introduce a new online tool. The majority of the class will be spent exploring the tool together in an interactive manner. During each class students will be given an assignment which utilizes the knowledge they gained in class and helps them to further explore the new tool. After taking this class students will be proficient in the use of each online tool and will be able to apply their knowledge to learning new tools and programs.

Course Notes: Students will need to bring a laptop to class each day.

Recommended Prep: Genetics 201 or with permission from the instructor.

### **Spring 2019**

First Meeting Date: Thursday, February 7, 2019

Final Meeting Date: Thursday, April 11, 2019

Location: Countway 403

Course Head: Neena Haider, [neena.haider@schepens.harvard.edu](mailto:neena.haider@schepens.harvard.edu)

Curriculum Fellow: Rachel Wright, [Rachel\\_Wright@hms.harvard.edu](mailto:Rachel_Wright@hms.harvard.edu)



## Human Biology and Translational Medicine

### **HBTM 305QC Molecular Bases of Eye Disease**

*Darlene Dartt and Magali Saint-Geniez*

2 Units

M 3:00 – 5:00 pm

This course provides an overview of the pathogenic processes of prevalent ocular diseases. The goals of the course are: (i) to explore the structural and functional aspects of the eye relevant to understanding its pathology, (ii) to review the manifestations of common eye diseases and their effects on vision, (iii) to discuss current views and research in the pathophysiology, and strategies for therapeutic intervention. For most sessions, the basic science and clinical topics will be presented by two faculty lecturers.

### **Spring 2019**

**First Meeting:** Monday, January 21, 2019

**Final Meeting:** Monday, April 22, 2019

**Location:** Schepens Eye Research Institute, 2<sup>nd</sup> Floor Conference Room

**Course Heads:** Darlene Dartt [dartt@vision.eri.harvard.edu](mailto:dartt@vision.eri.harvard.edu) and Magali Saint-Geniez [magali@vision.eri.harvard.edu](mailto:magali@vision.eri.harvard.edu)

**Course Coordinator:** Bridget Boles, [Bridget\\_Boles@MEEI.HARVARD.EDU](mailto:Bridget_Boles@MEEI.HARVARD.EDU)

## **HBMT 308QC Experimental Design and Analysis of Eye and Vision Studies**

*Russell Woods, Lotfi Merabet, Eric YinShan Ng, Christopher Bennett, Magali Saint-Genez, Matthew Bronstad, Daniel Sun, Corinna Bauer, Alex Bowers and Tobias Elze*

2 Units Enrollment: Limited to 16

Tue 2:00 – 4:00pm (every 2 weeks)

This course will be a series of workshops in which the design and analysis of experiments conducted within vision and eye research will be considered. At each session, a faculty member will provide and introduce data from a real study that they have conducted as an example. Issues around experimental design will be discussed. Then, using the participant's own software on their computer, we will work through analyses of that data, guided by two faculty members. Thus, participants will handle real data and address real experimental design and data issues.

Course Notes: Participants must bring a laptop computer with a statistical analysis package with which they are familiar. Data will be available for download in advance of each session

Recommended Prep: An assignment will be provided before each session and participants will be expected to complete that assignment before the session. The assignment will be reviewed at the start of the workshop. Another assignment will be given at the end of each workshop. Participants will have one week to complete and submit. Grading and feedback will be provided.

### **Spring 2019**

**First Meeting Date:** February 5, 2019

**Final Meeting Date:** April 16, 2019

**Location:** 2W Common Room, Schepens Eye Research Institute, 20 Staniford Street, Boston

**Course Head:** Russell Wood, [russell\\_woods@meei.harvard.edu](mailto:russell_woods@meei.harvard.edu) and Lotfi Merabet, [Lotfi\\_Merabet@MEEI.HARVARD.EDU](mailto:Lotfi_Merabet@MEEI.HARVARD.EDU)

## Immunology

### **Immunology 301QC Autoimmunity**

*Francisco Quintana*

2 Units

M 4:00 – 6:00

This course will focus on basic immunological mechanisms of autoimmune diseases, with an emphasis on recent advances in the field. At each session, we will focus on a particular topic and discuss three important publications.

### **Spring 2019**

**First Meeting Date:** February 25, 2019

**Final Meeting Date:** April 22, 2019

**Location:** Jeffrey Modell Immunology Center, Room 258

**Course Head:** Francisco Quintana, [franquin@broadinstitute.org](mailto:franquin@broadinstitute.org)

### **Immunology 302QC Clinical Sessions**

*Rachael Clark*

2 Units

T 12:00 – 1:00pm

Lectures by physician scientists and clinical exposure to patients with immunologically mediated diseases. The goal is to foster translational research into human immunologic disease.

Course Notes: Only first year Harvard Immunology PhD and Masters Students.

### **Spring 2019**

**First Meeting Date:** TBD

**Final Meeting Date:** TBD

**Location:** TBD

**Course Head:** Rachael Clark, [rclark@bwh.harvard.edu](mailto:rclark@bwh.harvard.edu)

## **Immunology 305QC Neuro-Immunology in Development, Regeneration and Disease**

*Isaac Chiu, Beth Stevens, Jun Huh and Michael Carroll*

2 units

Th 4:00 – 6:30

It is increasingly clear that the nervous system and immune system share parallel molecular pathways, and communication between neurons and immune cells play significant roles in homeostasis and disease. This course will investigate current topics in neuro-immunology: CNS development, chronic pain, neuro-degeneration, aging, axon regeneration, auto-immunity and infection. We will focus our discussions on molecular mechanisms shared by the immune and nervous systems and the molecular cross-talk between these two systems.

Each class will cover a specific topic in neuro-immunology. Students should be prepared to lead discussions on pre-selected papers for each session.

### **Spring 2019**

**First Meeting Date:** April 11, 2019

**Final Meeting Date:** May 30, 2019

**Location:** Jeffrey Modell Immunology Center, Room 100

**Course Heads:** Isaac Chiu, [isaac\\_chiu@hms.harvard.edu](mailto:isaac_chiu@hms.harvard.edu), Beth Stevens, [beth.stevens@childrens.harvard.edu](mailto:beth.stevens@childrens.harvard.edu) and Michael Carroll, [Michael.Carroll@childrens.harvard.edu](mailto:Michael.Carroll@childrens.harvard.edu).

## **Immunology 306QC Systems Immunology**

*Christophe Benoist and Nir Hacohen*

2 Units

F 1:30 - 4:30

Our focus in this course is on the emerging field of systems immunology. We will learn how leading-edge technologies -- including transcriptomics, epigenomics, proteomics, genetic perturbation screens and genetic associations -- can be used to effectively discover immune cell types and states, intracellular and intercellular circuits underlying immunity, and mechanisms of disease. Classes will consist of a lecture (1-2 hours) followed by a companion workshop (1-2 hours) for hands-on computational analysis of data related to the lecture.

### **Spring 2019**

**First Meeting Date:** February 1, 2019

**Final Meeting Date:** April 26, 2019

**Location:** Jeffrey Modell Immunology Center, Room 100

**Course Heads:** Christophe Benoist and Nir Hacohen

**Immunology 317QC Strategies to Achieve Durable Anti-Microbial Host Defense** *Wayne Marasco and Quan Zhu*

2 units. Enrollment: Limited to 15

T 10:00 – 12:00

Achieving long term immunity in humans to emerging viral pathogens is an important component of global health for which there are broad socioeconomic and geopolitical implications. Yet this effort has been thwarted because of genetic variability of circulating strains and ease of undergoing antibody neutralization escape. In addition, zoonotic transfer of viruses to humans can lead to emergence of new viruses into the human population that can lead to pandemics in the absence of anti-viral herd immunity. This course will primarily focus on broadly neutralizing and protective anti-viral antibody responses and how critical epitope selection on viral glycoproteins that can help to achieve long-term immunity. We will examine through classical and contemporary readings several principles that can be used to design vaccines and anti-viral antibodies to target the virus's Achilles heel. Critical teachings in this class will include studying how immunoediting of viruses can drive neutralization escape and zoonotic transfer across species. We will discuss the molecular characteristics of bone marrow derived long-lived plasma cells. We will also discuss how to interrogate the broadly neutralizing antibody response to natural infection and vaccines using modern molecular techniques such as NGS and Ab RepSeq. There is also much effort in the field to engineer broadly neutralizing antibodies for passive immunotherapy as prophylactic, preemptive and therapeutic agents. These treatments include therapeutic antibody gene transfer and bi- and trispecific anti-viral monoclonal antibodies. Numerous viruses will be discussed including HIV and emerging influenza, coronaviruses, flaviviruses, alpha viruses, Ebola and others. We will touch on intracellular microbial pathogens. The course will be structured with 20-30 min didactic lectures by Dr. Marasco and other lecturers followed by discussion of 3-5 published papers on the assigned topic of the day.

Course Notes: There has been explosive growth of our understanding of host defense against microbial infections. However, our immune responses are not always protective and in fact, can promote microbial evolution. The most dramatic examples of this comes from the study of RNA viruses where immune editing by the viruses results in neutralization escape which is commonly seen. Is this different from what cancer cells do? This course will be primarily immunology based but will provide a strong understanding of how to select the viral proteins that can be targeted to block virus attachment, uncoating and egress. We will focus on how we can establish durable antiviral immunity through active and passive immunization. We will get the pulse of the class and see what directions and topics we want to cover and some of the course readings can be tailored to this interest.

Recommended Prep: Background in immunology and virology is strongly recommended. Must be a PhD student at Harvard or postdoctoral fellow otherwise course director permission will be needed to enroll

**Spring 2019**

**First Meeting Date:** Tuesday, January 29, 2019

**Final Meeting Date:** Tuesday, April 2, 2019

**Location:** TMEC 423

**Course Head:** Wayne Marasco, Wayne\_Marasco@dfci.harvard.edu

**Dates and Tentative Topics: (Subject to Change)**

Schedule 1 (1/29): In vitro neutralization vs in vivo protection

Schedule 2 (2/5): Finding a viruses Achilles Heel

Schedule 3 (2/12): Long term immunologic memory

Schedule 4 (2/26): Vaccine and therapeutic strategies against HIV

Week of 28 – No Class (Marasco)

Schedule 5 (3/5): Vaccine and therapeutic strategies against influenza

Schedule 6 (3/12): Vaccine and therapeutic strategies against flaviviruses, Denge, WNV, Zika, etc

Schedule 7 (3/19): Vaccine and therapeutic strategies against coronaviruses including SARS and MERS. What did we learn?

Schedule 8 (3/26): Therapeutic antibody gene transfer coming to age

Schedule 9 (4/2): Alpha viruses, Ebola and one mycobacterium of global interest, TB

## Medical Sciences

### **Medical Sciences 312OC Graduate TA Training in the Biomedical Sciences**

*Bradley Coleman, Jason Heustis and Diane Lam*

2 Units

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.

**Learning Objectives:** At the conclusion of this quarter course, graduate TAs will be able to:

- Apply evidence based teaching practices to their own teaching, including backwards design, effective questioning and active learning
- Approach interactions with their students thoughtfully and respectfully
- Reflect upon their own teaching, accurately assess their strengths and weaknesses, and identify approaches to improve student outcomes

### **Spring 2019**

**First Meeting:** Tuesday January 28, 2019

**Final Meeting:** Thursday May16, 2019

**First Meeting Location:** based on student availability

**Course Head:** Bradley Coleman, Bradley\_Coleman@hms.harvard.edu

## Microbiology and Immunobiology

**Microbiology 360QC The Human Microbiome: Comprehensive experimental design and methodologies**

*Aleksandar Kostic and Abigail Sloan Devlin*

2 Units Enrollment: Limited to 15

Mon Wed 1:00 – 2:30pm

This is a comprehensive introduction to the study of human microbial communities and their functions relevant to human physiology. Topics covered include metagenomics, mechanistic interactions of the microbiome with metabolism, the immune system, and the gut-brain axis. Rather than lectures, this course is primarily a critical discussion of the literature

**Spring 2019**

**First Meeting Date:** January 28, 2019

**Final Meeting Date:** March 13, 2019

**Location:** Folin Wu Room, C Building, HMS Longwood Campus

**Course Heads:** Aleksandar Kostic, [Aleksandar.Kostic@joslin.harvard.edu](mailto:Aleksandar.Kostic@joslin.harvard.edu) and Abigail Sloan Devlin, [Sloan.Devlin@hms.harvard.edu](mailto:Sloan.Devlin@hms.harvard.edu)



**NOT OFFERED THIS SPRING**

**BCMP 312QC Quantitative Methods in Pharmacology**

Enrollment: Limited to 20

Jagesh Shah and Catherine Dubreuil

**Cell Biology 307QC Molecular Aspects of Chromatin Dynamics**

Raul Mostoslavsky, Johnathan Whetsine, Lee Zou and Danesh Moazed

**Cell Biology 309QC The Basics of Translation**

Spyridon Artanis-Tsakonas and David Van Vactor

**Immunology 303QC The Warring Genomes: Innate Immunity and Host Defense** Jonathan

Kagan

**Neurobiology 307QC Molecular Causes of Congenital Defects of the CNS**

Mary Loeken

**Neurobiology 312QC Neurodevelopment: Development of the Central Nervous System**

Mohini Lutchman and Christopher Walsh

**Neurobiology 317QC Comparative Neuroanatomy**

Wei-Chung Lee and Taralyn Tan

**Neurobiology 333QC Careers in Neuroscience**

David Ginty and Brendan Lehnert

**Virology 306QC Viruses of Bacteria and Archaea: Updates on Recent Key Literature**

Enrollment: Limited to 8

Max Nibert