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

First Meeting of Quarter Courses
Spring Term 2017-2018

Classes Start: Monday, January 22, 2018

Online Check-In (formerly known as registration):
Wednesday, January 17, 2018 – Monday, January 26, 2018
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 17-18 academic year

For information: Call 617-432-4134 or email dms_courses@hms.harvard.edu
BCMP 305QC Seminars in Molecular and Mechanistic Biology
Madhvi Venkatesh

Cell Biology 304QC Introduction to Human Gross Anatomy
Enrollment: Limited to 24
Gerald Greenhouse, Everett Anderson, Mohini Lutchman, Giorgio Giatsidis and David Cardozo

Cell Biology 307QC Molecular Aspects of Chromatin Dynamics
Raul Mostoslavsky, Johnathan Whetsine, Lee Zou and Danesh Moazed

Cell Biology 308QC Introduction to Histology for Graduate Students
Enrollment: Limited to 11
Gerald Greenhouse, Everett Anderson, Stephen Liberles and Adrian Salic

Cell Biology 309QC Basic in Translation
David Van Vactor and Spyridon Artovanis

Genetic 302QC Teaching 101: Bringing Effective Teaching Practices to your Classroom
Enrollment: Limited to 12
Christopher Burtner and Rachel Wright

Genetic 303QC Current Tools for Gene Analysis
Enrollment: Limited to 18
Neena Haider
Curriculum Fellow: Rachel Wright

HBMT 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, Christopher Bennett and Lotfi Merabet

Immunology 301QC Autoimmunity
Francisco Quintana

Immunology 302QC Clinical Sessions
Rachael Clark

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

Medical Sciences 316QC PhD Pathfinder
Enrollment: Limited to 50
Lisa Rossini and Joseph Arboleda
Course Manager: Jane Riccardi
Microbiology 360QC The Human Microbiome: Comprehensive experimental design and methodologies
Aleksandar Kostic and Abigail Sloan Devlin

Neurobiology 312QC Neurodevelopment: Development of the 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
**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: Students should contact Madhvi Venkatesh ([madhvi_venkatesh@hms.harvard.edu](mailto:madhvi_venkatesh@hms.harvard.edu)) regarding enrollment.

**Spring 2018**

**First Meeting Date:** Monday, January 22, 2018  
**Final Meeting Date:** Friday, May 4, 2018  
**Location:** Students will be contacted directly with a room  
**Course Head:** Madhvi Venkatesh, Madhvi_Venkatesh@hms.harvard.edu
Cell Biology

Cell Biology 304QC Introduction to Human Gross Anatomy
Gerald Greenhouse, Everett Anderson, Mohini Lutchman, Giorgio Giatsidis and David Cardozo

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 and undergraduate students. Students must sign up during the Spring semester sign up period.

Spring 2018
First Meeting Date: Friday, June 1, 2018
Final Meeting Date: Friday, June 29, 2018
Location: TMEC 447
Course Director: Gerald Greenhouse gerald_greenhouse@hms.harvard.edu
This course will discuss the role of chromatin dynamics in modulating molecular and cellular processes. The genetic information encoded in our DNA is organized in a defined set of chromosomes, which are condensed about 10,000 fold in order to fit in the cell nucleus. This compaction occurs through packaging of the DNA around histone proteins, a structure known as chromatin. In what was thought to be a rigid structure, today we know that chromatin is an amazingly dynamic folding that plays a crucial role in controlling accessibility of factors to the DNA, and as such, it regulates a vast number of critical biological functions, including gene transcription, DNA replication, DNA repair and cellular identity. In this course we will attempt to cover some of the basic molecular mechanisms that play a role in regulating chromatin dynamics, and in turn how chromatin itself modulate biological processes, including basic mechanisms of inheritance. We will specifically discuss the role of DNA methylation, histone modifications, nucleosome dynamics and novel epigenetic modulators in the context of different biological processes for which chromatin accessibility appears to play a crucial role.

Course Notes: The course consists of 12 sessions, 1.5 hr each session; 8 regular Sessions, 4 Discussion Sessions.

Spring 2018
First Meeting Date: March 20, 2018
Final Meeting Date: May 10, 2018
Location: TMEC L-007
Course Head: Raul Mostoslavsky, rmostoslavsky@mgh.harvard.edu

SYLLABUS

Title: Molecular Aspects of Chromatin Dynamics

Director: Raul Mostoslavsky

Lecturers: Lee Zou, Johnathan Whetstine, Danesh Moazed and Raul Mostoslavsky

Guest Lecturers (Discussion Sessions): Yang Shi, Bob Kingston, Yi Zhang and Jay Bradner. In these sessions students should come prepared to discuss a pre-selected recent paper from the lecturer’s lab.

Total: 18 hrs (12 sessions, 2 hr. each session; 8 regular Sessions, 4 Discussion Sessions)

Topic:

This course will discuss the role of chromatin dynamics in modulating molecular and cellular processes. The genetic information encoded in our DNA is organized in a defined set of chromosomes, which are condensed about 10,000 fold in order to fit in the cell nucleus. This compaction occurs through packaging of the DNA around histone proteins, a structure known as
chromatin. In what was thought to be a rigid structure, today we know that chromatin is an amazingly dynamic folding that plays a crucial role in controlling accessibility of factors to the DNA, and as such, it regulates a vast number of critical biological functions, including gene transcription, DNA replication, DNA repair and cellular identity. In this course we will attempt to cover some of the basic molecular mechanisms that play a role in regulating chromatin dynamics, and in turn how chromatin itself modulate biological processes, including basic mechanisms of inheritance. We will specifically discuss the role of DNA methylation, histone modifications, nucleosome dynamics and novel epigenetic modulators in the context of different biological processes for which chromatin accessibility appears to play a crucial role.

Session Topics:


Session 2: Basic concepts on epigenetic mechanisms of inheritance (DM). March 27th.


Session 4. Discussion Session: Yi Zhang. Identifying and overcoming epigenetic barriers for somatic cell nuclear transfer reprogramming April 5th.

Session 5. Histone modifications and histone variants. Translating epigenetic marks into function: the code, the writers and the readers. (JW). April 10th.


Session 9: Beyond transcription: chromatin regulation of DNA replication and DNA repair (LZ). May 1st.


Session 11: Epigenetics and human disease: chromatin determinants in cancer and
neurodegenerative disorders. Emerging roles for chromatin in other diseases (RM). May 8th.


Meeting Dates: Tuesdays 3.00-5.00pm

Discussion sessions Thursdays 3.00-5.00pm

Location: TMEC L-007

Course Heads: Raul Mostoslavsky (rmostoslavsky@mgh.harvard.edu), Danesh Moazed (danesh_moazed@hms.harvard.edu), Lee Zou (lzou1@partners.org), Johnathan Whetstine (johnathan_whetstine@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. Students will learn frozen section technique on brain tissue from Stephen Liberles.

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 2018
First Meeting Date: Tuesday, May 29, 2018
Final Meeting Date: Thursday, June 28, 2018
Location: TMEC 202
Course Director: Gerald Greenhouse gerald_greenhouse@hms.harvard.edu
Cell Biology 309QC The Basics of Translation
Spyridon Artanis-Tsakonas and David Van Vactor

2 units

W 6:00 – 8:00 PM

This course covers multiple perspectives from early phase basic research all the way to defining therapeutic strategies, clinical trial design and business models for bringing effective compounds to the marketplace. This Course Begins in October, and highlights a different advanced topic each week that will illustrate how investigation of basic principles and phenomena in cell and molecular biology open important doorways to understanding of disease mechanisms. One primary research article and one review article will be assigned each week to prepare students for discussion. Dinner provided at each session. In addition to mandatory weekly reading and discussion participation, one 6 page written assignment and oral presentation will be assigned to help students integrate the course material, improve communication skills, and identify novel experimental approaches: Write and present a proposal to launch a project with long-range therapeutic value for a neurodegenerative disorder.

Spring 2018
First Meeting Date: Feb 7, 2018
Final Meeting Date: April 18, 2018
Location: SGM 502
Course Head: Spyridon Artanis-Tsakonas, artavanis@hms.harvard.edu
Genetics

**Genetic 302QC Teaching 101: Bringing Effective Teaching Practices to your Classroom**  
*Christopher Burtner and Rachel Wright*

2 units Enrollment: Limited to 12

T 3:00 – 5:00

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 2018**  
First Meeting Date: Tuesday, February 27, 2018  
Final Meeting Date: Tuesday, May 1 2018  
Location: TMEC 423  
Course Head: Christopher Burtner, [Christopher_Burtner@hms.harvard.edu](mailto:Christopher_Burtner@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 18

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. At the end of 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.

Spring 2018
First Meeting Date: Thursday, February 1, 2018
Final Meeting Date: Thursday, April 12, 2018
Location: Countway 403
Course Head: Neena Haider, neena.haider@schepens.harvard.edu
Curriculum Fellow: Rachel Wright, 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 2018**  
**First Meeting:** Monday, January 8, 2018  
**Final Meeting:** Monday, April 9, 2018  
**Location:** Schepens Eye Research Institute, 2nd Floor Conference Room  
**Course Heads:** Darlene Dartt dartt@vision.eri.harvard.edu and Magali Saint-Geniez magali@vision.eri.harvard.edu  
**Course Coordinator:** Bridget Boles, Bridget.Boles@MEI.HARVARD.EDU
**HBMT 308QC Experimental Design and Analysis of Eye and Vision Studies**
Russell Wood, Lotfi Merabet and Christopher Bennett

2 Units Enrollment: Limited to 10

Tue 2:00 – 4:00pm

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.

**Spring 2018**
**First Meeting Date:** February 6, 2018
**Final Meeting Date:** April 17, 2018
**Location:** 2W Common Room, Schepens Eye Research Institute, 20 Staniford Street, Boston
**Course Head:** Russell Wood, russell_woods@meei.harvard.edu and Lotfi Merabet, 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 2018**  
**First Meeting Date:** February 26, 2018  
**Final Meeting Date:** April 25, 2018  
**Location:** Jeffrey Modell Immunology Center, Room 100  
**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 2018**  
**First Meeting Date:** Tuesday, March 13, 2018  
**Final Meeting Date:** Tuesday, May 1, 2018  
**Location:** Jeffrey Modell Immunology Center, 2nd floor, Room 258  
**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 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 2018**

**First Meeting Date:** March 22, 2018

**Final Meeting Date:** May 10, 2018

**Location:** Modell Center 258

**Course Heads:** Isaac Chiu, isaac_chiu@hms.harvard.edu, Beth Stevens, beth.stevens@childrens.harvard.edu and Michael Carroll, Michael.Carroll@childrens.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

Wed Fri 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 2018
First Meeting Date: January 24, 2018
Final Meeting Date: March 9, 2018
Location: Folin Wu Room
Course Heads: Aleksandar Kostic, Aleksandar.Kostic@joslin.harvard.edu and Abigail Sloan Devlin, Sloan_Demlin@hms.harvard.edu
Medical Sciences

Medical Sciences 312QC 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

Course Meetings:
Session 1 - Tuesday January 16th 4PM-6PM - TMEC 106
Session 2 - Thursday January 18th 4PM-6PM - TMEC 106
Session 3 - Tuesday January 23rd 4PM-6PM - TMEC 106
Additional meetings occur throughout the semester on a schedule agreed upon by the students and the appropriate Curriculum Fellow.

Spring 2018
First Meeting: Tuesday January 16, 2018
Final Meeting: Thursday April 26, 2018
First Meeting Location: TMEC 106
Course Head: Bradley Coleman, Bradley_Coleman@hms.harvard.edu
Medical Sciences 316QC PhD Pathfinder
Joseph Arboleda and Lisa Rossini

2 Units Enrollment: Limited to 50, instructor consent required

Monday - Friday, 5:00-7:00 (with an hour after for networking session) *
*Students are required to attend all 5 sessions

In this course, Ph.D. 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 Ph.D. 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 Ph.D. students interested in learning about the range of career options available to biomedical Ph.D.s. 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

Spring 2018
First Meeting: April 23, 2018
Final Meeting: April 27, 2018
Location: Modell 100
Course Co-Directors: Joseph Arboleda, Joseph Arboleda@MEEI.HARVARD.EDU
Assistant Director: Lisa Rossini, Lisa_Rossini@hms.harvard.edu
Course Manager: Jane Riccardi, jane_riccardi@hms.harvard.edu
Neurobiology 312QC Neurodevelopment: Development of the Central Nervous System
Mohini Lutchman and Christopher Walsh

2 Units Enrollment: Limited to 10. Instructor consent required

Mon 9am – 12pm

In this quarter course students will learn about the genetics and neurodevelopment of the central nervous system. The course format will include lectures on topics on Microcephaly, Epilepsy and Autism. In addition, there will be case studies, neuroanatomy laboratories and patient presentations of those affected with neurodevelopmental disease. Students will be assessed in a team-based setting.

Course Notes: There lab demonstrations comparing normal brains with those with neurodevelopmental disease. Harvard Faculty will participate in the course. Undergraduate enrollment requires the permission of the instructor.

Spring 2018
First Meeting Date: January 22, 2018
Final Meeting Date: March 5, 2018
Location: TMEC 447
Course Head: Mohini Lutchman, mohini_lutchman@hms.harvard.edu and Christopher Walsh, christopher.walsh@childrens.harvard.edu

Neurobiology 317QC Comparative Neuroanatomy
Wei-Chung Lee and Taralyn Tan

2 Units Enrollment: Limited to 25. Instructor consent required

Tue 2pm – 4pm

Neuroscientists employ diverse experimental approaches and model systems to study nervous system structure and function. Using in-class discussions of primary literature, this course will introduce students to basic principles of nervous system organization and modern methods to study neural circuits. Interactions among brain systems and comparison of circuit function across organisms spanning invertebrates to primates will be highlighted.

Spring 2018
First Meeting Date: February 20, 2018
Final Meeting Date: April 17, 2018
Location: WAB 236
Course Head: Wei-Chung Lee, wei-chung_lee@hms.harvard.edu
Neurobiology 333QC Careers in Neuroscience

David Ginty and Brendan Lehnert

2 Units Enrollment: Limited to 25. Instructor consent required

Th 5:30-7:00pm

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. The course meets in WAB 236 from 5:30PM-7PM beginning January 25th, 2015 and continues every other Thursday, though meeting dates may change subject to speaker availability. There will be eleven 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. Dinner is provided.

Spring 2018
First Meeting Date: January 25, 2018
Final Meeting Date: May 31, 2018
Location: WAB 236
Course Head: David Ginty, david_ginty@hms.harvard.edu
Teaching Assistant: Brendan Peltonen Lehnert, blehnert@hms.harvard.edu
NOT OFFERED THIS SPRING

**BCMP 312QC Quantitative Methods in Pharmacology**
Enrollment: Limited to 20
Jagesh Shah and Catherine Dubreuil

**Cell Biology 302QC Advanced Experimental Design for Biologists**
Enrollment Capacity: Limited to 24
Randall King and David Glass

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

**Immunology 306QC Systems Immunology**
Nir Hacohen, Nick Haining and Christophe Benoist

**Virology 306QC Viruses of Bacteria and Archaea: Updates on Recent Key Literature**
Enrollment: Limited to 8
Max Nibert