Quarter Courses
Spring Semester
2014

Spring Semester Online Registration
January 22 – 27, 2014
See Website:
http://www.registrar.fas.harvard.edu/registration-enrollment-degrees/online-registration-enrollment

Study Card Days:
January 27 and 28, 2014
9:30am – 4:30pm

Final Day to turn in Study Cards in Cambridge:
Friday, January 31, 2014

Spring Term Begins on: Monday, January 27, 2014
Add Deadline: Monday, March 10, 2014
Drop Deadline: Tuesday, March 25, 2014

Holidays:
President’s Day, Monday, February 17, 2014

Details Available at:
http://www.hms.harvard.edu/dms/Current/DMS_Quarter_Courses.html
Spring 2014 Quarter Courses

*BCMP 303qc. Molecular Movies: Advanced 3D Visualization with Maya
Catalog Number: 61072 Enrollment: Limited to 18.
Gael McGill (Medical School) David Lopes Cardozo (Medical School)

*BCMP 307qc. Molecular Approaches to Drug Action, Discovery, and Design
Catalog Number: 52371 Enrollment: May be limited.
Nathanael Gray (Medical School) and members of the Department

*BCMP 309qc. Principles of Drug Action in Man
Catalog Number: 63265
Timothy J. Mitchison (Medical School)

*Cell Biology 302qc. Advanced Experimental Design for Biologists
Catalog Number: 91286 Enrollment: Limited to 24.
Randy King (Medical School) David Glass (Medical School)

*Cell Biology 304qc. Introduction to Human Gross Anatomy
Catalog Number: 61023 Enrollment: Limited to 10.
David Lopes Cardozo (Medical School), Gerald Greenhouse, Everett Anderson, Mohini Lutchman

*Cell Biology 307qc. Molecular Aspects of Chromatin Dynamics
Catalog Number: 91774 Enrollment: Limited to 25.
Raul Mostoslavsky (Medical School), Danesh Moazed (Medical School), Johnathan Whetstine (Medical School), and Lee Zou (Medical School), and members of the Department

*Cell Biology 308qc. Introduction to Histology
Catalog Number: 38084 Enrollment: Limited to 11
Adrian Salic (Medical School), Stephen Daniel Liberles (Medical School), Gerald Greenhouse (Medical School)

*Cell Biology 309qc. Advanced Topics in Cell Biology
Catalog Number: 14797
David L. Van Vactor (Medical School) 2089 and members of the Medical School Faculty

*Cell Biology 310qc. Current Topics in Cancer Biology Research
Catalog Number: 60742
Charles D. Stiles (Medical School) 4828

*Genetics 302qc. Teaching 101: Bringing Effective Teaching Practices to your Classroom
Catalog Number: 91159 Enrollment: Limited to 15.
Fred Winston (Medical School), Johanna Gutlerner, and Henrike Besche

*HBTM 304qc. Drug Development: From Concept to Commercialization
Catalog Number: 83871 Enrollment: Limited to 30.
Michael Goldberg (Medical School)

*HBTM 305qc (formerly *Pathology 301qc). The Molecular Bases of Eye Disease
Catalog Number: 85085
*Immunology 302qc. Clinical Sessions
Catalog Number: 40428
Rachael Ann Clark (Medical School)

*Immunology 303qc. The Warring Genomes: Innate Immunity and Host Defense
Catalog Number: 55535
Jonathan C. Kagan (Medical School) 6235

*Immunology 305qc. Neuro-immunology in development, regeneration and disease – (New Course)
Catalog Number: 98545
Beth Stevens (Medical School) and Clifford Woolf (Medical School)

*Immunology 306qc. Systems Immunology
Catalog Number: 87129
Nir Hacohen (Medical School), Nick Haining (Medical School), Christophe Benoist (Medical School) and visiting speakers

WILL NOT BE OFFERED THIS SPRING:
*Microbiology 301qc. Molecular Mechanisms of Microbial Pathogenesis
Catalog Number: 76052 Enrollment: Limited to 15.
Marcia Goldberg (Medical School) 3783 and Simon L. Dove (Medical School)

WILL NOT BE OFFERED THIS SPRING:
*Neurobiology 301qc. Gene Therapy and Imaging for Nervous System Disorders
Catalog Number: 18456 Enrollment: Limited
Bakhos A. Tannous (Medical School) 6863, Xandra O. Breakefield (Medical School) 1428, Casey Maguire (Medical School) and Luk Vandenberghe (Medical School)

*Neurobiology 304qc. Regeneration and Repair in the Mammalian Nervous System: Cellular and Molecular Mechanisms
Catalog Number: 41092 Enrollment: Limited to 18.
Zhigang He (Medical School), Larry I. Benowitz (Medical School), Jeffrey D. Macklis (Harvard College), and Clifford Woolf (Medical School)

*Neurobiology 306qc. Quantitative Methods for Biologists – (Incoming Students Bootcamp Course)
Catalog Number: 8531 Enrollment: Limited to 80. Prior approval from course instructor needed.
Michael Springer, Richard T. Born (Medical School)
*BCMP 303qc. Molecular Movies: Advanced 3D Visualization with Maya*
Catalog Number: 61072 Enrollment: Limited to 18.
Gael McGill (Medical School) David Lopes Cardozo (Medical School)
Quarter course (spring term). F., 9–12.

Explore Maya’s vast visualization and animation capabilities in each of the phases of the 3D production pipeline will be presented including dynamics systems like Hair, nCloth, nParticles and PaintFx. Introduction to Maya’s Embedded Language (MEL).

Prerequisite: Molecular Movies: Introduction to 3D Visualization with Maya required.
*BCMP 307qc. – Molecular Approaches to Drug Action, Discovery, and Design*

Catalog Number: 52371 Enrollment: May be limited.

Nathanael Gray (Medical School) and members of the Department

Quarter course (spring term). Tu., Th., 3:30-5.

Application of molecular, systems, and structural biology, genetics, genomics, enzymology, and chemistry to drug action and development of new therapies. Analyzes molecular underpinnings of pharmacological principles. Examples drawn from numerous diseases including cancer, AIDS, Alzheimer’s and infectious diseases. This class includes small group paper based discussions and a case study (target choice) to reinforce the lectures, and to promote critical reading and thinking. Moreover, students may have to prepare chalk talks to promote thinking about experimental design based on questions provided in lecture will be. The final assessment is a written and oral proposal based in an unmet clinical need for which you discover a new drug with specifics regarding disease, molecular pathway or target, discovery approach, and validation of strategy/testing of compound, with some consideration for how to turn the compound into a clinically useful drug.

*Note:* This course pairs with *BCMP 309qc. Principles of Drug Action in Man.* Students who plan to take both quarter courses must sign up under BCMP 236.

**Spring 2014**
Meeting Dates: March 25, 27, April 1, 3, 8, 10, 15, 17, 22, 24, 29, May 1, 6, 8
Meeting Time: Tuesdays and Thursdays, 3:30-5.
First Meeting: Tuesday, March 25, 2014
Final Meeting: Thursday, May 8, 2014
Location: TMEC 324
Class size: May be limited
Course Head: Nathanael Gray, nathanael_gray@dfci.harvard.edu
Curriculum Fellow: Catherine Dubreuil, catherine_dubreuil@hms.harvard.edu

**If you plan to take a quarter course you must register for it on your study card**
**BCMP 309qc. Principles of Drug Action in Man**
Catalog Number: 63265
Timothy J. Mitchison (Medical School)
Quarter course (spring term). Tu., Th., 3:30-5.

BCMP309qc will familiarize students with central concepts in drug action in man at the level of molecules, cells, tissues and patients, and in relevant methods. These concepts and methods are central to modern drug development and regulatory evaluation. We will cover drug-target interactions, drug distribution and clearance (Pharmacokinetics, PK) and drug action (Pharmacodynamics, PD) at a quantitative level. We will illustrate these concepts through discussion of important small molecule, protein and nucleic acid drugs. We will also discuss the clinical trials process, why drug candidates fail, biomarkers, diagnostics, imaging in the human body, systems approaches to understanding diseases and drugs, and new frontiers in Therapeutics. The course will culminate in a discussion of cutting edge efforts to integrate molecular information with quantitative models of drug action (PK-PD models).

The course meets twice a week on Tuesdays and Thursdays with be interactive lectures, paper discussions, cases or problem solving workshops using simple mathematical models and computer programs.

**Prerequisites:** Familiarity with basic biochemistry and molecular structure. Experience with mathematical modeling software – e.g. MATLAB – is a plus but not required. We will schedule introductory session and office hours to help students with software and quantitative problems as needed. Experience in introductory pharmacology is a plus but not required. We will not duplicate introductory material, but will provide students who lack this experience will catch-up reading.

**Note:** This course pairs with *BCMP 307qc. Molecular Approaches to Drug Action, Discovery, and Design. Students who plan to take both quarter courses must sign up under BCMP 236.

**Schedule**

<table>
<thead>
<tr>
<th>Date/Room*</th>
<th>Room</th>
<th>FACULTY</th>
<th>TOPIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tu 1/28</td>
<td>TMEC</td>
<td>Mitchison</td>
<td>TBA</td>
</tr>
<tr>
<td>Th 1/30</td>
<td>TMEC</td>
<td>Mitchison</td>
<td></td>
</tr>
<tr>
<td>Tu 2/4</td>
<td>TMEC</td>
<td>Mitchison</td>
<td></td>
</tr>
<tr>
<td>Th 2/6</td>
<td>TMEC</td>
<td>Mitchison</td>
<td></td>
</tr>
<tr>
<td>Tu 2/11</td>
<td>TMEC</td>
<td>Mitchison</td>
<td></td>
</tr>
<tr>
<td>Th 2/13</td>
<td>TMEC</td>
<td>Mitchison</td>
<td></td>
</tr>
<tr>
<td>Tu 2/18</td>
<td>TMEC</td>
<td>Mitchison</td>
<td></td>
</tr>
<tr>
<td>Th 2/20</td>
<td>TMEC</td>
<td>Mitchison</td>
<td></td>
</tr>
<tr>
<td>Tu 2/25</td>
<td>TMEC</td>
<td>Mitchison</td>
<td></td>
</tr>
<tr>
<td>Th 2/27</td>
<td>TMEC</td>
<td>Mitchison</td>
<td></td>
</tr>
<tr>
<td>Tu 3/4</td>
<td>TMEC</td>
<td>Mitchison</td>
<td></td>
</tr>
<tr>
<td>Th 3/6</td>
<td>TMEC</td>
<td>Mitchison</td>
<td></td>
</tr>
<tr>
<td>Tu 3/11</td>
<td>TMEC</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Spring 2014**
Meeting Dates: January 28, 30, February 4, 6, 11, 13, 18, 20, 25, 27, March 4, 6
First Meeting: Tuesday January 28, 2014
Final Meeting: Thursday, March 11, 2014
Location: TMEC 324
Course Head: Timothy J. Mitchison, timothy_mitchison@hms.harvard.edu
Curriculum Fellow: Catherine Dubreuil, PhD, catherine_dubreuil@hms.harvard.edu

**If you plan to take a quarter course you must register for it on your study card**
**Cell Biology 302qc. Advanced Experimental Design for Biologists**
Catalog Number: 91286 Enrollment: Limited to 24.
*Randy King (Medical School) 3941 and David Jonathan Glass (Medical School)*
Quarter course (spring term). M., W., 4–6.

Theory and practice of experimental design. Built on principles from experimental design text. Conducted in workshop setting to apply general principles to specific student projects. Emphasis placed on strategic project planning and data interpretation. The course is divided into five sections: 1) Theory of experimental science; frameworks and questions; 2) System testing and validation; 3) Designing Experiments: Subject size; data distribution; controls; criteria for readouts; 4) Data interpretation 5) Model building and validation. Though the focus of the course is not on proposal writing, the course will provide an excellent foundation for students as they begin to think about writing PQE proposals.

Course Website: MyCourses CB300C-Spring 2013

**Spring 2014**
Meeting Dates: February 3, 5, 17, 19, 24, 26; March 3, 5, 17, 19
Meeting Time: 4-6 PM
First Meeting: Monday, February 3, 2014
Final Meeting: Wednesday, March 19, 2014
Location: TMEC 324
Class size: 24
Course Heads: Randy King, randy_king@hms.harvard.edu, David Glass, David_Glass@hms.harvard.edu

**If you plan to take a quarter course you must register for it on your study card**
Cell Biology 304qc. Introduction to Human Gross Anatomy
Catalog Number: 61023 Enrollment: Limited to 10.

David Lopes Cardozo (Medical School), Gerald Greenhouse, Everett Anderson, Mohini Lutchman
Quarter course (spring term). M., W., F., 12-7., some 12-5

Lectures, laboratory dissections, prosections, and group discussions 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. Some discussion of human evolution and comparative anatomy will be included in the lectures.

Class size is limited to 15. To receive credit students must attend all sessions and participate enthusiastically. All sessions will be held in the TMEC Building on the Longwood Medical Campus. Textbooks, anatomical atlases, and computer programs will be available for student use.

Note: Obtain signature on Study Card day from TMEC 442.

Schedule
Session 1: Monday, June 23, 12:00-7:00. Introduction followed by lecture and dissection back and posterior upper limb (12:00-5:00); discussion of clinical issues related to back and upper limb (5:00-7:00, pizza or sandwiches provided)

Session 2: Wednesday, June 25, 12:00-7:00. Lecture and dissection laminectomy: exposure of the spinal chord, meninges, spinal nerves. (12:00-5:00); discussion of clinical cases that highlight structure and function of the back and spinal chord. (5:00-7:00, pizza or sandwiches provided)

Session 3: Friday, June 27, 12:00-5:00. Lecture and dissection gluteal region and posterior lower limb (12:00-5:00); discussion of clinical issues that relate to the gluteal region and posterior limb (5:00-7:00, pizza or sandwiches provided)

Session 4: Monday, June 30, 12:00-7:00. Lecture and dissection chest muscles and upper limb. (12:00-5:00); discussion of clinical cases that highlight structure and function of the chest muscles and upper limb (5:00-7:00, pizza or sandwiches provided)

Session 5: Wednesday, July 2, 12:00-7:00. Lecture and dissection of the hand (12:30-5:00); discussion of clinical cases that highlight structure and function of the upper limb and hand (5:00-7:00, pizza or sandwiches provided)

Session 6: Monday, July 7, 12:00-7:00. Lecture and dissection anterior lower limb and foot (12:00-5:00); discussion of clinical cases that highlight structure and function of the anterior limb and foot (5:00-7:00, pizza or sandwiches provided)

Session 7: Wednesday, July 9, 12:00-7:00. Lecture and dissection thorax—lungs, pleural cavities, mediastinum, heart, great vessel (12:00-5:00); discussion of clinical cases that highlight structure and function of organs in the thorax (5:00-7:00, pizza or sandwiches provided)

Session 8: Friday, July 11, 12:00-7:00. Lecture and dissection abdominal wall, abdominal viscera, retroperitoneum, pelvis (12:00-5:00); discussion of clinical cases that highlight structure and function of abdominal organs (5:00-7:00, pizza or sandwiches provided).

Session 9: Monday, July 14, 12:00-7:00. Lecture and dissection neck (12:00-5:00); discussion of clinical cases that highlight structure and function of the neck (5:00-7:00, pizza or sandwiches provided)

Session 10: Wednesday, July 16, 12:00-7:00. Lecture and dissection cranial cavity—discussion of brain structure function by David Cardozo (12:00-5:00); tutorial discussion of function of cranial nerves (5:00-7:00, pizza or sandwiches provided)
Session 11: **Friday, July 18, 12:00-7:00.** Lecture and dissection *face, oral cavity, pharynx, larynx* (12:00-5:00); tutorial discussion of genes & morphogenetic processes that relate to cranial-facial development (5:00-7:00, pizza or sandwiches provided)

Session 12: **Monday, July 21, 12:00-5:00.** Dissection of eye and inner ear.

**Spring 2014**
Meeting Dates: June 23, 25, 27, 30; July 2, 7, 9, 11, 14, 16, 18, 21.
Time: 12:00-7:00pm
First Meeting: Monday, June 23, 2013
Final Meeting: Friday, July 21, 2013
Location: TMEC 447
Class Size: 10
Course Head: Gerald Greenhouse, gerald_greenhouse@hms.harvard.edu

**If you plan to take a quarter course you must register for it on your study card**
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.

**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.

**Schedule**

**Session 1.** General overview on chromatin dynamics and mechanisms of inheritance (JW). **March 11th**

**Session 2.** Basic concepts on epigenetic mechanisms of inheritance (DM). **March 13th**

**Session 3.** The chemistry of DNA methylation. Establishment, maintenance and erasure of DNA methylation. The function of DNA methyl-transferases and methyl-binding proteins. The new kid on the block: cytosine 5-hydroxymethylation (RM). **March 25th**

**Session 4.** Discussion Session: Yi Zhang. Tet proteins are regulators of 5-OH-MeC. **March 27th**

**Session 5.** Histone modifications and histone variants. Translating epigenetic marks into function: the code, the writers and the readers. (JW). **April 1st**

**Session 6.** Discussion Session. Yang Shi: specificity of histone demethylases. **April 3rd**

**Session 7.** Nucleosome remodeling and the transcriptional silencing/activation switch. The role of ATP-remodelling complexes, Polycomb Group Proteins and Trithorax Group Proteins (LZ). **April 8th**

**Session 8.** Discussion Session. Bob Kingston: PGC and Trx complexes in epigenetics. **April 10th**

**Session 9.** The RNA world. Roles of RNAi in heterochromatin Assembly. Non-coding RNAs in epigenetic mechanisms of inheritance (DM). **April 15th**

**Session 10:** Discussion Session. Jay Bradner: “Targeting chromatin factors in the clinic: lessons from bromodomain proteins”. **April 17th**.

**Session 11.** Beyond transcription: chromatin regulation of DNA replication and DNA repair (LZ). **April 29th**

**Session 12.** Epigenetics and human disease: chromatin determinants in cancer and neurodegenerative disorders. Emerging roles for chromatin in other diseases (RM). **May 6th**

**Spring 2014**

Meeting Dates: Tuesdays, 3:00-5:00pm. Discussion sessions Thursdays, 3:00-5:00pm.

*Please note:* Thursday, March 13 will be a lecture and will take place from 3:30-5:30pm.

Location: TMEC 448 (Session 10 on 4/17 will be held in TMEC 104)

Class size: up to 25 students

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

**If you plan to take a quarter course you must register for it on your study card**
**Cell Biology 308qc. Introduction to Histology**

Catalog Number: 38084 Enrollment: Limited to 11

*Adrian Salic (Medical School), Stephen Daniel Liberles (Medical School), Gerald Greenhouse (Medical School)*

*Quarter course (spring semester). M., W., F., 1-5.*

This class is recommended for graduate students whose thesis work will benefit from a strong working knowledge of cell structure and tissue architecture. If there is room postdoctoral fellows may also attend. Class size is limited to 11. To receive credit students must attend all sessions and participate enthusiastically. All sessions will be held in the TMEC Building on the Longwood Medical Campus.

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 three 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. In the last two sessions, students will have hands on training in tissue staining with recently developed compounds in the lab of Adrian Salic and learn frozen section technique on brain tissue from Stephen Liberles.


**Schedule**

Session 1 Epithelia & Glands (Greenhouse)
Session 2 Connective Tissue (Greenhouse)
Session 3 Muscle (Greenhouse)
Session 4 Nerves (Greenhouse)
Session 5 Alimentary system & Respiratory System (Greenhouse)
Session 6 Urinary Tract (Greenhouse)
Session 7 Male and Female Reproductive Systems (Greenhouse)
Session 8 How is tissue prepared for histological study? Wet lab with Adrian Salic
Session 9 wet lab with Stephen Liberles—frozen sections of brain

**Spring 2014**

Meeting Dates: June 2, 4, 6, 9, 11, 13, 16, 18, 20
Time: Mondays, Wednesdays, Fridays, 1:00-5:00pm
First Meeting: Monday, June 2, 2014
Location: TMEC 126
Course heads: Adrian Salic adrian_salic@hms.harvard.edu, Stephen Liberles stephen_liberles@hms.harvard.edu, Gerald Greenhouse gerald_greenhouse@hms.harvard.edu

**If you plan to take a quarter course you must register for it on your study card** **
*Cell Biology 309qc. Advanced Topics in Cell Biology*

Catalog Number: 14797

David L. Van Vactor (Medical School) 2089 and members of the Medical School Faculty

Quarter course (spring term). Th., 6–7:30.


This Course Begins in January, 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.

**Schedule**

<table>
<thead>
<tr>
<th>Date</th>
<th>Speaker</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>January 23</td>
<td>Davie Van Vactor</td>
<td>-- Course Introduction/Overview</td>
</tr>
<tr>
<td></td>
<td>Randy King</td>
<td>Topic: High Content Screening for Small Molecule Regulators of Cell Cycle</td>
</tr>
<tr>
<td>January 30</td>
<td>Wade Harper</td>
<td>Topic: Ubiquitin and Neurodegenerative Disease</td>
</tr>
<tr>
<td>February 6</td>
<td>Fred Goldberg</td>
<td>Topic: Protein Homeostasis and Drug Development: Successes, Opportunities &amp; Challenges</td>
</tr>
<tr>
<td>February 13</td>
<td>Steve Gygi</td>
<td>Topic: Love is Homemade and so is Proteomics</td>
</tr>
<tr>
<td>February 20</td>
<td>Robin Reed</td>
<td>Topic: Shared Molecular Pathway Links the Motor Neuron Diseases ALS and SMA</td>
</tr>
<tr>
<td>February 27</td>
<td>Dan Finley</td>
<td>Topic: Enhancing Proteasome Activity to Eliminate Toxic Misfolded Proteins from Neurons</td>
</tr>
<tr>
<td>March 6</td>
<td>Sam Reck-Peterson</td>
<td>Topic: Mechanistic Understanding of Microtubule Motors and Neuronal Disease</td>
</tr>
<tr>
<td>March 13</td>
<td>Yang Shi</td>
<td>Topic: Epigenetics as a Key Means to Understand</td>
</tr>
<tr>
<td>March 20</td>
<td>Junying Yuan</td>
<td>Topic: Regulation of Programmed Cell Death: from Apoptosis to Necroptosis</td>
</tr>
<tr>
<td>March 27</td>
<td>John Flanagan</td>
<td>Topic: Axon Guidance Mechanisms Provide Insight into Neural Regeneration</td>
</tr>
<tr>
<td>April 3</td>
<td>Davie Van Vactor</td>
<td>FINAL DISCUSSION MEETING</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Back up topic: Synapse Development as a Lens to Understand Neurodegeneration</td>
</tr>
</tbody>
</table>

**Spring 2014**

Meeting Dates: January 23, 30; February 6, 13, 20, 27; March 6, 13, 20, 27; April 3

Meeting Time: Thursdays, 6:00-7:30pm. Dinner provided.

First Meeting: Thursday, January 23, 2014

Final Meeting: Thursday, April 3, 2014

Location: SGMB 502

Course Instructor: David Van Vactor, davie_vanvactor@hms.harvard.edu

**If you plan to take a quarter course you must register for it on your study card**
*Cell Biology 310qc. Current Topics in Cancer Biology Research*

Catalog Number: 60742  
Charles D. Stiles (Medical School) 4828  
Quarter course (spring term). M., W., F., 2:30-4:30.

This course is designed for graduate students that are interested in pursuing cancer biology research. Leading and cutting edge technologies in cancer biology research are explored in-depth using recent papers of high profile in a round-table discussion format. Topics include: Cancer Cell Signaling, Metastasis and EMT, Cancer Genomics, Cancer and microRNAs, and Cancer Stem Cells.

**Schedule**

<table>
<thead>
<tr>
<th>Class</th>
<th>Date</th>
<th>Moderator</th>
<th>Topic</th>
</tr>
</thead>
</table>
| 1     | March 24, 2014 | Zafira Castano, PhD  
(Sandra S. McAllister’s lab)  
Tuomas Tamela, PhD  
(Tyler Jacks’ lab) | Introduction and Tumor Suppressor Genes            |
| 2     | March 26, 2014 | Jessie Hsu, PhD  
(Stuart Orkin’s lab -TBC-) | Genome Instability and Mutations                 |
| 3     | March 28, 2014 | John Power, PhD  
(George Daley’s lab) | miRNAs in Cancer                                 |
| 4     | March 31, 2014 | Christine Fillmore, PhD  
(Carla Kim’s lab) | Cancer Stem Cells                                 |
| 5     | April 2, 2014  | Christine Chaffer, PhD  
(Robert A. Weinberg’s lab) | Epithelial-Mesenchymal Transition in Cancer       |
| 6     | April 4, 2014  | Francois Mercier, MD  
(David T. Scadden’s lab) | Avoiding Immune Destruction                       |
| 7     | April 7, 2014  | Zafira Castano, PhD  
(Sandra S. McAllister’s lab) | Tumor Microenvironment and Metastasis            |

**Spring 2014**

Meeting Dates: March 24, 26, 28, 31; April 2, 4, 7  
Meeting Time: Monday, Wednesday, Friday, 2:30-4:30pm.  
First Meeting: Friday, March 24, 2014  
Final Meeting: Monday, April 7, 2014  
Location: Please email course contact for room information.  
Course Instructor: Charles D. Stiles, charles_stiles@dfci.harvard.edu  
Course Contact: Megan Mittelstadt, PhD, megan_mittelstadt@hms.harvard.edu
*Genetics 302qc. Teaching 101: Bringing Effective Teaching Practices to your Classroom*

Catalog Number: 91159, Enrollment: Limited to 15.

*Fred Winston (Medical School), Johanna Gutlerner, and Henrike Besche*

Quarter course (spring term). Th., 1-3:30.

Are you interested in a career in teaching and would like to learn more about how to design a syllabus and a lesson? Are you planning on being a TA for a course, but have no idea about how to run a discussion session? Would you like to learn how to give engaging and effective lectures? As the interest in education and teaching careers continues to grow in the scientific community, so does the need to arm our educators with the tools and strategies to create a successful classroom environment. This course will survey the basics of effective teaching practices, focusing on practical application and real-life examples. Topics to be discussed will include effective lecturing techniques, using goals and learning styles to inform lesson planning and design, assessing student understanding, and facilitating discussions. The course will emphasize in-class learning activities that will allow students the opportunity to practice their teaching skills and receive feedback and suggestions from peers and instructors.

*Sessions led by Johanna Gutlerner and Henrike Besche.*

**Spring 2014**

Meeting Dates: March 13, 27, April 3, 10, 17, May 1, 8

*Note: there will be no classes on March 20th and April 24th.*

First Meeting: Thursday, March 13, 2014

Final Meeting: Thursday, May 8, 2014

Location: LHRRB 313

Curriculum Fellow and Course Instructor: Johanna Gutlerner, johanna_gutlerner@hms.harvard.edu

**If you plan to take a quarter course you must register for it on your study card**
**HBTM 304qc. Drug Development: From Concept to Commercialization**

Catalog Number: 83871  Enrollment: Limited to 30.

*Michael Goldberg (Medical School)*

*Quarter course* (spring term). Tu., 5-7.

This course is intended to provide graduate students with exposure to the diverse aspects of the drug development process. The recently approved cystic fibrosis drug Kalydeco will be used as an exemplar, though the themes of discovery, development, manufacturing, business development, commercialization, and growth are relevant across most therapeutics. Each class will include a lecture by a person involved in that particular aspect of Kalydeco development followed by a group discussion of the associated case study.

**Outline of Sessions:**

1. Overview of Kalydeco: From basic science to drug commercialization
   a) Proteasome Research: Potential as a therapeutic target
   b) Drug Discovery: Timelines, organization, assays, screens, chemistry, and pharmacology
2. Drug Development: Clinical trial design and regulatory approval
3. Manufacturing: Scaling, cGMP, and outsourcing
4. Business Development: strategy, negotiation
   a) Commercialization: Pricing, reimbursement, launch
   b) Growth: Sales, marketing, competition, partnerships
5. Patient Panel: Participation in a clinical trial, patient experience
6. Summary

**Assignments:** In addition to contributing to active class participation, students will be asked to prepare a two-page analysis of a subject matter of choice that is relevant to the course. This assignment is intended to provide each student with an opportunity to explore a personal interest in a thoughtful manner that extrapolates beyond the specific content of the course.

**Spring 2014**

Meeting Dates: March 25; April 1, 8, 15, 22, 29; May 6, 13, 20, 27.

Meeting Time: Tuesdays, 5:00-7:00pm

First Meeting: Tuesday, March 25, 2014

Final Meeting: Tuesday, May 27, 2014

Location: TMEC 227

Course Head: Michael Goldberg, michael_goldberg1@dfci.harvard.edu

**If you plan to take a quarter course you must register for it on your study card**
*HBTM 305qc (formerly *Pathology 301qc). The Molecular Bases of Eye Disease*
Catalog Number: 85085

Darlene Ann Dartt (Medical School) 6904 and Magali Saint-Geniez
Course Coordinator: Mary Wheeler
Quarter course (spring term). M., 3–5.

In this course, we will strive for an understanding of the molecular bases for diseases that target the eye. The goals of the course are: (I) to explore the structural and functional aspects of the eye relevant to understanding the pathology, (II) to review the manifestations of the disease and its 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.

**Topics**

**Monday, January 6** – The Basic Structure of the Eye: Dr. Elio Raviola; Anatomy of Accessory Glands: Anatomy of Accessory Glands: Dr. Pablo Argüeso

**Monday, January 13** – Anterior Segment: Dr. Joseph Ciolino; Posterior Segment: Dr. Leo Kim

**Monday, January 27** – Development of the Retina: Dr. Connie Cepko; Anatomy and Physiology of the Retina: Dr. Richard Masland

**Monday, February 3** – Dry Eye and Ocular Surface Disease: Basic Science & Clinical Perspectives: Drs Ilene Gipson and Deborah Jacobs

**Monday, February 10** – Ocular Tissue Regeneration and Remodeling: Drs. James Zieske and Dong Feng Chen

**Wednesday, February 19** – Ocular Tumors: Drs. Bruce Ksander and Grace Lee

**Monday, March 3** – Lens/Cataract: Drs. Sheldon Rowan and Peggy Chang

**Monday, March 10** – Molecular Basis of Complex (and Common) Strabismus: Drs. Elizabeth Engle and David Hunter

**Monday, March 17** – Glaucoma and Optic Nerve: Drs. Janey Wiggs and Larry Benowitz

**Tuesday, March 25** – Age-Related Macular Degeneration (AMD): Drs. Ivana Kim and Kip Connor

**Monday, March 31** – Diabetic Retinopathy and Retinal Neovascularization: Drs. Joseph Arboleda-Velasquez and Magali Saint-Geniez

**Monday, April 7** – Genetics of Inherited Diseases: Drs. Neena Haider and Eric Pierce

**Tuesday, April 22** – Ocular Inflammation and Infection: Drs. Balaraj Menon and Pedram Hamrah

**Spring 2014**
Meeting Dates: January 6, 13, 27; February 3, 10, 19; March 3, 10, 17, 25, 31; April 7, 22
Meeting Time: Mondays, 3:00-5:00pm (with the exception of Tuesday, March 19th and Tuesday, April 16th)
First Meeting: Monday, January 6, 2014
Location: 2nd Floor Conference Room, Schepens Eye Research Institute
Course Heads: Darlene Dartt, 617-912-0272, darlene.dartt@schepens.harvard.edu and Magali Saint-Geniez, 617-912-2580, magali.saintgeniez@schepens.harvard.edu
Course Coordinator: Mary Wheeler, 617-912-2586, mary_wheeler@meei.harvard.edu

**If you plan to take a quarter course you must register for it on your study card**
*Immunology 302qc, Clinical Sessions*
Catalog Number: 40428

Rachael Ann Clark (Medical School) 3429
Quarter course (spring term). Tu., 12-1.

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

*Note:* Limited to Immunology students. Hours for clinical visits to be arranged.

Exposure to patients with immunologically mediated diseases. What is known about human immunologic diseases what critical questions remain unanswered. Formulate grant proposals that address critical questions for understanding or treatment of human immunologic disease.

**Required for, and limited to, all Immunology G1’s**

**Spring 2014**
Meeting Dates: March 11, 25; April 1, 8, 15, 22, 29
First Meeting: Tuesday, March 11, 2014
Final Meeting: Tuesday, April 29, 2014
Location: Jeffrey Modell Immunology Center, Room 258
Course Director: Rachael Clark, MD, PhD, rclark1@partners.org

**If you plan to take a quarter course you must register for it on your study card**
*Immunology 303qc, The Warring Genomes: Innate Immunity and Host Defense*

Catalog Number: 55535

Jonathan C. Kagan (Medical School) 6235

Quarter course (spring term). Mondays, 4-6 p.m.

This course will focus on basic cellular and molecular aspects of innate immunity, with an emphasis on recent advances in the field. Each class will cover a specific topic, and supporting literature will be provided by the instructor.

*Prerequisite:* Students are expected to have already taken IMM 201.

**Schedule**

January 6: Principles of Innate Immunity (Alan Ezekowitz)

January 13: Genetics of Innate Immune signaling pathways (Jon Kagan)

January 20: Cell biology of Innate Immune signaling pathways (Jon Kagan)

January 27: Inflammasomes (Tiffany Horng)

February 3: Structures of innate immune signaling complexes (Hao Wu)

February 10: Non-infectious triggers of innate immunity (Nir Hacohen)

February 17: no class

February 24: Translating basic scientific discoveries in a therapy (Alan Ezekowitz)

March 3: Jeopardy Wrap up (Alan Ezekowitz)

**Spring 2014**

Meeting Dates: January 6, 13, 20, 27; February 3, 10, 17, 24; March 3

Time: Mondays, 4:00-6:00pm

First Meeting: January 6, 2014

Final Meeting: March 3, 2014

Location: Jeffrey Modell Immunology Center, Room 258

iSite: [http://isites.harvard.edu/icb/icb.do?keyword=k78728&pageid=icb.page404114](http://isites.harvard.edu/icb/icb.do?keyword=k78728&pageid=icb.page404114)

Course Head: Jonathan Kagan, jonathan.kagan@childrens.harvard.edu

**If you plan to take a quarter course you must register for it on your study card**
*Immunology 305qc. Neuro-immunology in development, regeneration and disease – (New Course)*
Catalog Number: 98545
Beth Stevens (Medical School) and Clifford Woolf (Medical School)
Quarter course (spring term). Th., 4–6.

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, neurodegeneration, 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 2014**
Meeting Dates: May 1, 8, 15, 22, 29, June 5, 12
Meeting Times: Thursdays, 4:00-6:30pm
First Meeting: Thursday, May 1, 2014
Final Meeting: Thursday, June 12, 2014
Location: Jeffrey Modell Immunology Center, Room 258
Class size: 20 students
Course Heads: Beth Stevens, beth.stevens@childrens.harvard.edu, Clifford Woolf, clifford.woolf@childrens.harvard.edu

**If you plan to take a quarter course you must register for it on your study card**
*Immunology 306qc. Systems Immunology*

Catalog Number:

*Nir Hacohen (Medical School), Nick Haining (Medical School), Christophe Benoist (Medical School) and visiting speakers*

Quarter course (spring term). Fr., 9-11

Our focus in this course is on the emerging field of systems immunology. Each session will review a class of experimental approaches, followed by a critical discussion of illustrative papers. Hands-on workshops will introduce students to computational tools for analyzing large-scale datasets, focusing on gene expression.

**Schedule**

<table>
<thead>
<tr>
<th>Date</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>7-Feb</td>
<td>Overview of systems immunology</td>
</tr>
<tr>
<td>14-Feb</td>
<td>Profiling molecular states: DNA</td>
</tr>
<tr>
<td>21-Feb</td>
<td>Profiling molecular states: RNA</td>
</tr>
<tr>
<td>28-Feb</td>
<td>Profiling molecular states: proteins (and others)</td>
</tr>
<tr>
<td>7-Mar</td>
<td>Perturbation (deliberate and natural) functional screens: cells and mice</td>
</tr>
<tr>
<td>14-Mar</td>
<td>Inferring genotype-phenotype maps in humans: monogenic and polygenic inheritance</td>
</tr>
<tr>
<td>28-Mar</td>
<td>Quantitative modeling</td>
</tr>
<tr>
<td>4-Apr</td>
<td>Reconstructing genetic and physical networks</td>
</tr>
<tr>
<td>11-Apr</td>
<td>Systems medicine: disease states, mechanisms and therapeutics</td>
</tr>
<tr>
<td>18-Apr</td>
<td>Basic computational tools for biologists</td>
</tr>
<tr>
<td>25-Apr</td>
<td>Group analysis project review</td>
</tr>
</tbody>
</table>

Hands-on workshops (dates TBD for 4 x 2-3 hour workshops): basic computational tools for the analysis of large-scale expression and other data, including online tools, expression analysis, RNA-seq, group analysis projects.

**Spring 2014**

Meeting Dates: Feb 7-Apr 25
Meeting Time: Fridays, 9:00-11:00am
First Meeting: Friday, February 7, 2014
Final Meeting: Friday, April 25, 2014
Location: Jeffrey Immunology Modell Center, Lecture Hall 100A
Course Heads: Nir Hacohen, nhacohen@partners.org, Nick Haining, Nicholas_Haining@dfci.harvard.edu, Christophe Benoist, Christophe_Benoist@hms.harvard.edu

**If you plan to take a quarter course you must register for it on your study card**
*Microbiology 301qc. Molecular Mechanisms of Microbial Pathogenesis*

Catalog Number: 76052 Enrollment: Limited to 15.

Marcia Goldberg (Medical School) 3783 and Simon L. Dove (Medical School)
Quarter course (spring term). One 1.5 hr session weekly. Hours to be arranged.

During infection, microbial pathogens employ sophisticated mechanisms to enhance infection or dissemination. These mechanisms frequently involve signaling or activation of host pathways. Recent investigations in the field have provided insight into aspects of the genetic regulation of some of these systems and the characterization of the proteins or factors involved in signaling in some of these pathways.

This course will focus on the recent literature on molecular mechanisms involved in microbial pathogenesis during host-pathogen interactions. The pathogens that will be discussed include *Salmonella*, *Shigella*, *Pseudomonas aeruginosa*, *Yersinia*, *Listeria monocytogenes*, and *Mycobacteria*. The specific topics that will be covered in the course include:

1. Bacterial delivery of proteins directly into host cells
2. Regulation of protein secretion in pathogenic bacteria
3. Bacterial modulation of host protein degradation pathways
4. Acute versus chronic infection of the host
5. Bacterial signaling that alters the host cytoskeleton
6. Bacterial response to host signals
7. Bacterial alteration of host chromosome dynamics

Course Directors: Marcia Goldberg, mgoldberg1@partners.org, and Simon Dove, simon.dove@childrens.harvard.edu
WILL NOT BE OFFERED THIS SPRING:

*Neurobiology 301qc. Gene Therapy and Imaging for Nervous System Disorders*

Catalog Number: 18456 Enrollment: Limited to 12.

Bakhos A. Tannous (Medical School) 6863, Xandra O. Breakefield (Medical School) 1428, Casey Maguire (Medical School) and Luk Vandenberghe (Medical School)

Quarter course (fall term). T., 3–5.

This quarter course will offer students an introduction to gene therapy, as well as different techniques in molecular imaging used to monitor gene transfer and the response to therapy. We will discuss current trends in gene therapy including viral vectors, siRNA and cell-based therapy and the ongoing clinical trials for several central nervous system (CNS) disorders. Each 2-hour session will consist of 1-hour lectures with a faculty member lecturing for 1 hr on the topic followed by group discussion or student presentations of relevant publications. Students will be responsible for reading and critically discussing relevant papers each week. Class participation is required and enrollment is limited to 12 students.

**Proposed Sessions:**
- Overview of gene therapy methods
- Overview of non-invasive imaging techniques
- Parkinson’s disease
- Alzheimer’s disease
- Brain tumors
- Lysosomal storage diseases
- Adrenoleucodystrophy (ALD)
- Amyotrophic lateral sclerosis (ALS)
- Retinal diseases

**Meeting Dates:** Tuesdays from September 3 to October 29, 2013

**Meeting Time:** Tuesdays 3-5pm

**Location:** TMEC Building, Room L-008

**Class Size:** 15

**Course Head:** Bakhos Tannous, btannous@hms.harvard.edu, (617)726-6026

**Co-Organizers:** Xandra Breakefield, breakfield@hms.harvard.edu; Luk Vandenberghe: luk_vandenberghe@meei.harvard.edu; Casey Maguire, cmaguire@partners.org
*Neurobiology 304qc. Regeneration and Repair in the Mammalian Nervous System: Cellular and Molecular Mechanisms*

Catalog Number: 41092 Enrollment: Limited to 18.

Zhigang He (Medical School), Larry I. Benowitz (Medical School), Jeffrey D. Macklis (Harvard College), and Clifford Woolf (Medical School)

Quarter course (spring term). W., 5:30-7:30.

This course will discuss cellular and molecular approaches and mechanisms to enable regeneration and repair of cellular circuitry in the mammalian nervous system. Prototypical examples relating to neuronal circuits relevant to optic nerve and spinal cord injury, ALS, and peripheral nerve injury will be covered. We will: compare and contrast aspects of neural development (developmental neurogenesis and circuit formation) with adult neural regeneration and plasticity; discuss limitations to neuronal regeneration in the mature mammalian CNS and PNS following degeneration or injury; examine CNS and PNS regeneration approaches directed at overcoming intrinsic limitations; and explore developmental controls and gene manipulation to promote neurogenesis, directed differentiation, axonal regeneration, and circuit repair in the diseased adult brain. We will also discuss recent progress in reprogramming approaches and their relevance to neural repair. The course will combine overview lectures and critical discussion of central examples from the primary literature.

**Session Topics**
1. General overview of CNS regenerative biology, and literature presentation— LB/ZH and Eric Huebner (TA)
2. PNS regeneration and functional restoration - CW
3. Structural and functional responses to degeneration and injury in the mature CNS – LB
4. Cellular and molecular mechanisms to overcome limitations on axon regeneration in the mature PNS & CNS (1 of 2) – LB/ZH
5. Cellular and molecular mechanisms to overcome limitations on axon regeneration in the mature PNS & CNS (2 of 2) – ZH/LB
6. Cellular replacement, transplantation; constitutive and induced neurogenesis – JM
7. Reprogramming and ES/iPS stem cell differentiation for disease modeling – JM/CW
8. Future prospects for application of developmental neuroscience to CNS regeneration: Student presentations (ZH/LB/JM/CW)

**Spring 2014**
Meeting Dates: Wednesdays - March 26; April 2, 9, 16, 23, 30; May 7, 14.
Meeting Time: 5:30 – 7:30 PM
First Meeting: Wednesday, March 26, 2014
Location: CLS (3 Blackfan Circle), 12th floor conference room
Course Heads: Zhigang He, 617-919-2353, zhigang.he@childrens.harvard.edu; Larry Benowitz, 617-919-2278, larry.benowitz@childrens.harvard.edu; Jeffrey Macklis, 617-495-5413, jeffrey_macklis@harvard.edu; Clifford Woolf, 617-919-2393, Clifford.Woolf@childrens.harvard.edu

**If you plan to take a quarter course you must register for it on your study card.**
*Neurobiology 306qc. Quantitative Methods for Biologists – (Incoming Students Bootcamp Course)*

Catalog Number: 8531  Enrollment: Limited to 80. Prior approval from course instructor needed.

*Michael Springer, Richard T. Born (Medical School)*

Quarter course (fall term; repeated spring term). Hours to be arranged.

Refresher course (spring term). Hours to be arranged.

The goals of this course are to introduce students to programming in the MATLAB environment and to begin using this tool for analyzing data and for gaining intuition about the behavior of complex systems through the use of numerical simulations.

*Note:* More details can be found by going to the Division of Medical Sciences website, then clicking Current Students and selecting Quarter Courses.

**Bootcamp 2014**

Meeting Dates: May 19, 20, 21, 22, 23, 24, 26, 27, 28
First Meeting: Monday, May 19, 2014
Final Meeting: Wednesday, May 28, 2014
Location: TMEC 227
Course Website: http://springerlab.org/qmbc/
Class Limit: 80
Course Director: Michael Springer, michael_springer@hms.harvard.edu
Curriculum Fellow: Melanie Stefan, Melanie_Stefan@hms.harvard.edu

**If you plan to take a quarter course you must register for it on your study card**