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

First Meeting of Courses
Spring Term 2015-2016

FAS Study Card Deadline: Friday, January 29 at 5 p.m.

Add/Drop Deadline (without fee): Monday, February 8, 2016
Final Add Course Deadline (with fee): Monday, March 7, 2016
Final Drop Course Deadline (with fee): Tuesday, March 22, 2016

Holidays:
Martin Luther King Day: Monday, January 18, 2016
President’s Day: Monday, February 15, 2016
Spring Recess: March 12-20, 2016

Online Registration: January 20 at 9:00 a.m. – January 25 at 11:59 p.m.

For information: Call 617-432-4134 or email dms_courses@hms.harvard.edu
DIVISION OF MEDICAL SCIENCES  
Ph.D. Programs at Harvard Medical School  
2015-2016 Spring Term Course Offerings

BCMP 213 Behavioral Pharmacology  
Enrollment: Limited to 15.  
Jack Bergman and Brian D. Kangas

BCMP 234 Cellular Metabolism and Human Disease  
Thomas Michel  
Curriculum Fellow: Christopher Burtner

BCMP 236 Modern Drug Discovery: From Principles to Patients (Updated)  
Timothy Mitchison, Catherine Dubreuil, Nathanael Gray

Cell Biology 201 Principles of Cell Biology  
Danesh Moazed  
Curriculum Fellow: Christopher Wood

Cell Biology 207 Vertebrate Developmental and Regenerative Biology  
Enrollment: Limited to 20.  
Andrew Lassar, Jordan Kreidberg, Sean Megason, Olivier Pourquié, Jayaraj (Jay) Rajagopal, Jessica Whited, and Yingzi Yang

Cell Biology 211 Molecular and Systems Level Cancer Cell Biology  
Enrollment: Limited to 27.  
Peter Sicinski, Jarrod Marto, and Marc Vidal  
Curriculum Fellow: Megan Mittelstadt

DRB 331 Critical Analysis and Experimental Approaches in Developmental Biology (January Session Course)  
Enrollment: Limited to 15.  
David Van Vactor and Ya-Chieh Hsu  
Curriculum Fellow: Ted Feldman

Genetics 202 Human Genetics  
Enrollment: Limited to 20.  
Matthew Warman  
Curriculum Fellow: Emily Gleason

Genetics 216 Advanced Topics in Gene Expression [BCMP 310qc, Eukaryotic Gene Regulation, has been merged into Genetics 216.] (Updated)  
Fred Winston, Robert Kingston, and Stephen Buratowski  
Enrollment: Limited to 16.
Genetics 219. Inheritance and Weird Stuff – Will not be offered
Chao-Ting Wu

Genetics 228 Genetics in Medicine - From Bench to Bedside
Christopher Newton-Cheh and David Sweetser

HBTM 200 Principles and Practice of Human Pathology
Scott Lovitch

Immunology 202 Immune and Inflammatory Diseases (Updated)
Filip Swirski and Mikael Pittet
Teaching Assistants: Zimeng Zhang and Nelson Lamarche

Immunology 204 Critical Readings for Immunology
Duane Wesemann

Immunology 301 Immunology Seminar
Michael Carroll and William Haining
Enrollment: Limited to 20.

Microbiology 201 Molecular Biology of the Bacterial Cell
David Rudner, Thomas Bernhardt, Simon Dove, and Ann Hochschild
Curriculum Fellow: Bradley Coleman

Microbiology 210 Microbial Sciences: Chemistry, Ecology, and Evolution (Updated)
Michael Gilmore
Teaching Fellow: Elizabeth Fiore

Microbiology 213 Social Issues in Biology
Enrollment: Limited to 15.
Jonathan Beckwith, Louis Guenin and Graduate Students

Neurobiology 204 Systems Neuroscience
Enrollment: Limited to 25.
Rachel Wilson, Richard Born, Mark Andermann, Michael Do, Christopher Harvey, and Margaret Livingstone

Neurobiology 209 Neurobiology of Disease
Edward Kravitz and Patricia Musolino
Curriculum Fellow: Brendan Lehnert

Neurobiology 211 Molecular and Developmental Neurobiology
Lisa Goodrich, Sandeep Datta, Michela Fagiolini, Chenghua Gu, Pascal Kaser, Joshua Kaplan, Maria Lehtinen, and Beth Stevens
SHBT 202 Clinical Aspects of Speech and Hearing
Konstantina Stankovic and Richard Lewis
Teaching Assistant: Katherine Shera

SHBT 203 Anatomy of Speech and Hearing [January Session Course]
Barbara Fullerton, James Heaton, James Kobler

SHBT 204 Speech Communication
Satrajit Ghosh

SHBT 205 Neural Coding and Perception of Sound (Updated)
Bertrand Delgutte, M. Christian Brown, John Guinan, Daniel Polley, and Josh McDermott

Virology 201 Virology
Sean P.J. Whelan and James Cunningham
BCMP 213 Behavioral Pharmacology
Jack Bergman and Brian D. Kangas

4 Units Enrollment: Limited to 15, consent of instructor required.

Tue and Th 3:30-5:00

Introduction to behavioral pharmacology of CNS drugs (e.g., psychomotor stimulants, antischizophrenics, opioid analgesics, antianxiety agents); seminar format with emphasis on behavioral methodology (i.e., model and assay development) and pharmacological analysis (i.e., receptor selectivity and efficacy); attention to tolerance, drug dependence/addiction/treatment, and basic behavioral processes.

Course Notes: Offered jointly with the Medical School as BP 719.0.

Spring 2016
First Meeting: Tuesday, January 26, 2016
Final Meeting: Thursday, April 28, 2016
Location: Sever 208
Course Heads: Jack Bergman, jack_bergman@hms.harvard.edu, and Brian D. Kangas, bkangas@mclean.harvard.edu

BCMP 213 Spring 2016 Tentative Schedule

The dates below are primarily intended to serve as an indication of the sequence of classroom topics. Some units may take more or less time to cover and all material may be subject to change. It is the student’s responsibility to remain abreast of any changes.

Jan 26 Course Objectives and Requirements; Organization of Course; The Use of Behavior in Pharmacological Research: Dose-Response Analysis

28 Behavioral Processes: Unconditioned and Conditioned Behavior as Assays

Feb 2 Maintenance and Suppression of Behavior under Schedules of Reinforcement

4 Drugs as Reinforcers I (Historical Capstones and Schedule Control)

9 Drugs as Reinforcers II (Choice and Complex Contingencies)

11 Drugs as Discriminative Stimuli I (The Basics)

16 Drugs as Discriminative Stimuli II (Advanced Issues)
18  Fundamentals of Pharmacology I: Pharmacodynamics
    (Basics of Receptor Theory and Signaling Processes)
23  Fundamentals of Pharmacology II: Pharmacokinetics (Biodisposition)
25  The Nature of Tolerance and Dependence I

March 1  The Nature of Tolerance and Dependence II
3    Psychomotor Stimulants (Receptor Mechanisms in Behavioral Stimulation and
     Reinforcement)
8    Nicotine and Caffeine
10   Opioids I (Antinociceptive Evaluation and Assays)
15   No Class (Spring Recess)
17   No Class (Spring Recess)
22   Opioids II (Receptor Mechanisms in Analgesia and Opioid Addiction: Selectivity)
24   Opioids III (Receptor Mechanisms in Analgesia and Opioid Addiction: Efficacy)
29   Antipsychotics I (Evaluation and Assays)
31   Antipsychotics II (Development of Typical and Atypical Antipsychotic Drugs)

April 5    No Class (Experimental Biology 2016)
7    No Class (Experimental Biology 2016)
12   Cannabinoids
14   The Nature of Drug Addiction
19   Medication Development Strategies for Drug Addiction
21   Behavioral Treatments of Addiction
26   Oral Presentations I
28   Oral Presentations II

May 10  Final Examination: Paper Due on Tuesday May, 10th at 5pm
**BCMP 234 Cellular Metabolism and Human Disease**

*Thomas Michel*

4 Units Enrollment: Consent of instructor required.

**Mon, Wed, and Fri 9:00-10:30**

Cellular and organismal metabolism, with focus on interrelationships between key metabolic pathways and human disease states. Genetic and acquired metabolic diseases and functional consequences. Interactive lectures and critical reading conferences are integrated with clinical encounters. Enrollment may be limited.

**Recommended Prep for Undergraduate students only:** Knowledge of introductory biochemistry, genetics, and cell biology required (MCB 52 and 54 or equivalent); one year of organic chemistry.

**Spring 2016**

First Meeting: Monday, January 25, 2016

Final Meeting: Friday, May 5, 2016

Location: Building C 114 Cannon, with some exceptions listed below.

Course Head: Thomas Michel, thomas_michel@hms.harvard.edu

Curriculum Fellow: Christopher Burtner, Christopher_Burtner@hms.harvard.edu

All Lectures are held in Building C 114 Cannon with the following exceptions:

<table>
<thead>
<tr>
<th>Class Date</th>
<th>Room(s)</th>
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<tbody>
<tr>
<td>Friday, January 29, 2016</td>
<td>TMEC-140, TMEC-144, TMEC-151</td>
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<tr>
<td>Friday, February 5, 2016</td>
<td>NRB 1031</td>
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<tr>
<td>Friday, February 12, 2016</td>
<td>TMEC-140, TMEC-144, TMEC-151</td>
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<tr>
<td>Friday, March 4, 2016</td>
<td>TMEC-140, TMEC-144, TMEC-151</td>
</tr>
<tr>
<td>April 1, 2016</td>
<td>TMEC-140, TMEC-144, TMEC-151</td>
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</table>
BCMP 236 Pharmacokinetics and Modern Drug Discovery *(Updated)*

*Timothy Mitchison, Catherine Dubreuil, Nathanael Gray*

4 Units

**Tue and Th 3:30-5:00**

This course will familiarize students with central concepts in drug action and therapeutics: specifically we will cover concepts surrounding Pharmacokinetics (PK) and the intersection of PK and medicinal chemistry in both lectures and cases based discussions. These concepts are central to modern drug development and evaluation. In the course we will cover drug-target interactions, Pharmacokinetics and Pharmacodynamics. This course will have a focus on modern approaches to therapeutic development for small molecules, protein based therapeutics, nucleic acid based drugs and antibacterial compounds as well new frontiers in therapeutic discovery.

**Course Notes:** This course is the combination of the BCMP 309qc and 307qc quarter courses, offered as half course. Students who plan to take the two quarters must sign up under BCMP 236.

**Spring 2016**
**First Meeting:** Tuesday, January 26, 2016  
**Final Meeting:** TBA Thursday, May 5, 2016  
**Location:** TMEC-306  
**Course Heads:** Timothy Mitchison, timothy_mitchison@hms.harvard.edu  and Catherine Dubreuil catherine_dubreuil@hms.harvard.edu  
**Course Instructors:** Nathanael Gray, nathanael_gray@dfci.harvard.edu
Cell Biology

Cell Biology 201 Principles of Cell Biology
Danesh Moazed

Units 4

Lectures: Mon, Wed, and Fri 10:30-12:00
(Please note that Friday lectures will take place only on the following dates: January 29, April 22 and 29.)

Discussion Sections: Fri at 10:30-12:00

CB201 is a graduate level course intended to teach critical concepts in cell biology, and expose students to current and quantitative approaches in cell biology research. Topics include the molecular basis of cellular dynamics, subcellular compartmentalization, protein trafficking, chromosome biology and epigenetics, regulated ubiquitin-proteasome pathways, cell cycle regulation, cytoskeleton and motor dynamics, signal transduction, cell-cell interactions, and programmed cell death.

Spring 2016
First Meeting: Monday, January 25, 2016
Final Meeting: Friday, April 29, 2016
Friday Discussion Sections: February 5, 12, 19, 26; March 4, 11, 25; April 1, 8, 15
Location: Lectures will be held in Building C 114 Cannon. Discussion sections will be held in TMEC-111 (except Feb 12, 2016 and April 1, 2016 in TMEC-118), TMEC-204, TMEC-205, TMEC-342, and TMEC L-008
Course Head: Danesh Moazed, Danesh_Moazed@hms.harvard.edu
Curriculum Fellow: Christopher Wood, Christopher_Wood@hms.harvard.edu

Course Schedule
Module 1: Protein Translocation, Membrane Trafficking, and Nuclear Transport
M1: January 25th | Course Introduction Danesh Moazed & Tom Rapoport
W1: January 27th | Protein Translocation Tom Rapoport
F1: January 29th | Vesicle Transport Tom Rapoport
M1: February 1st | Nuclear Transport Tom Rapoport
W1: February 3rd | Vesicle Transport Tom Rapoport
F1: February 5th | Discussion Section 1
&: - Huelsmann, B., et al. (2012) The permeability of reconstituted nuclear pores provides direct evidence for the

**Module 2**  
**Cytoskeleton and Motors**

*Module 2 Schedule*

**M1**  February 8th | Cytoskeleton *Tim Mitchison*
**W1**  February 10th | Cytoskeleton *Tim Mitchison*
**F1**  February 12th | Discussion Section 2

**Module 2 Notes**

**M1**  February 15th | Holiday
**W1**  February 17th | Molecular Motors *David Pellman*
**F1**  February 19th | Discussion Section 3

**Module 3**  
**Protein Folding, Turnover, and the Ubiquitin Proteasome System**

*Module Schedule*

**M1**  February 22nd | Protein Homeostasis and Regulation of the Cell Cycle *Dan Finley*
**W1**  February 24th | Protein Homeostasis and Regulation of the Cell Cycle *Dan Finley*
**F1**  February 26th | Discussion Section 4
&  - Case Study | Stopping the Spread of Amyloid

**Module Notes**

**M1**  February 29th | Protein Homeostasis and Regulation of the Cell Cycle *Dan Finley*
**W1**  March 2nd | Methods Lecture on Proteomics *Steven Gygi*
**F1**  March 4th | Discussion Section 5
&  - <Quantitative proteomics study>(TBD)

**Module Schedule**

**M1**  March 7th | Protein Homeostasis and Regulation of the Cell Cycle *Dan Finley*
**W1**  March 9th | Protein Homeostasis and Regulation of the Cell Cycle *Dan Finley*
**F1**  March 11th | Discussion Section 6

**Module 4**  
**Nuclear Organization and Gene Regulation**

*Module 4 Schedule*

**M1**  March 21st | Nuclear and Genome Organization *Danesh Moazed*
W1· March 23rd | Nuclear and Genome Organization Danesh Moazed

F1· March 25th | Discussion Section 7


M1· March 28th | Epigenetic Memory Mechanisms Danesh Moazed

W1· March 30th | Methods Lecture on Light Microscopy Jennifer Waters

F1· April 1st | Discussion Section 8


M1· April 4th | Methods Lecture on Single Particle Electron Microscopy Maofu Liao

Module 5 l· Signal Transduction in Growth and Development

W1· April 6th | Signal Transduction During Development Davie Van Vactor

F1· April 8th | Discussion Section 9

&· - paper TBD.

M1· April 11th | Signal Transduction, Growth, and Proliferation Brendan Manning

W1· April 13th | Signal Transduction, Growth, and Proliferation Brendan Manning

F1· April 15th | Discussion Section 10

&· - paper TBD.

M1· April 18th | Holiday

W1· April 20th | The Hedgehog pathway Adrian Salic

F1· April 22nd | Cell Death and Survival Joan Brugge

Methods in Cell Biology - Continued

M1· April 25th | Methods Lecture on Quantitative Biology at the Single Cell Level Galit Lahav

W1· April 27th | Methods Lecture on Synthetic Biology and Microfabrication Tim Mitchison

F1· April 29th | Closing Session
Cell Biology 207  Vertebrate Developmental and Regenerative Biology
Andrew Lassar, John G. Flanagan, Jordan Kreidberg, Sean Megason, Olivier Pourquié, Jayaraj (Jay) Rajagopal, Jessica Whited, Yingzi Yang

4 Units Enrollment: Limited to 20, consent of instructor required.

Lecture: Mon and Wed 2:00-4:00
(Please note that the meetings on March 2, April 6, and May 11 will end at 5 p.m.)

Analyzes the developmental programs of frog, chick, zebrafish, and mouse embryos, emphasizing experimental strategies for understanding the responsible molecular mechanisms that pattern the vertebrate embryo. Signaling pathways controlling morphogenesis, organogenesis, stem cells and regeneration will be discussed in detail.

Course Notes: Offered jointly with the Medical School as CB 710.0. Includes lectures and conference sessions in which original literature is discussed in depth. Short research proposals are required in lieu of exams.

Spring 2016
First Meeting: Monday, January 25, 2016
Final Meeting: Wednesday, May 11, 2016
Location: TMEC 128 (Learning Studio-Castle) on Monday, January 25, 2016 only; the subsequent lectures for this course will be in TMEC-L007. Conferences will take place in TMEC 342 and TMEC 346
Course Head: Andrew Lassar, andrew_lassar@hms.harvard.edu
Course Instructors: John G. Flanagan, Jordan Kreidberg, Sean Megason, Olivier Pourquié, Jayaraj (Jay) Rajagopal, Jessica Whited, Yingzi Yang

CB207 - Vertebrate Developmental and Regenerative Biology
Course Schedule, Spring 2016

<table>
<thead>
<tr>
<th>Signaling pathways in development and establishment of the body plan</th>
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</thead>
<tbody>
<tr>
<td>25-Jan-16 Mon Lecture</td>
<td>A tool box to tinker an embryo and the vertebrate game plan</td>
</tr>
<tr>
<td>27-Jan-16 Wed Lecture</td>
<td>Molecular signals that control cell fate specification through gastrulation</td>
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<tr>
<td>1-Feb-16 Mon Conference</td>
<td>Morphogens and mesoderm/neural induction</td>
</tr>
<tr>
<td>3-Feb-16 Wed Lecture</td>
<td>Wnt signaling, morphogenesis and epithelial-mesenchymal transitions</td>
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<tr>
<td>8-Feb-16 Mon Conference</td>
<td>Gastrulation, Wnt signaling and the molecular basis for tissue morphogenesis</td>
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<tr>
<td>10-Feb-16 Wed Lecture</td>
<td>Positional specification of cells in the developing neural tube</td>
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<tr>
<td>15-Feb-16</td>
<td>Mon</td>
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<td>17-Feb-16</td>
<td>Wed</td>
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<td>22-Feb-16</td>
<td>Mon</td>
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<td>24-Feb-16</td>
<td>Wed</td>
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<tr>
<td>29-Feb-16</td>
<td>Mon</td>
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<tr>
<td>2-Mar-16</td>
<td>Wed</td>
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**Elaboration of the body plan**

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<thead>
<tr>
<th>Date</th>
<th>Day</th>
<th>Type</th>
<th>Title</th>
<th>Speaker(s)</th>
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<tbody>
<tr>
<td>7-Mar-16</td>
<td>Mon</td>
<td>Lecture</td>
<td>Placode and neural crest development</td>
<td>Mageson</td>
</tr>
<tr>
<td>9-Mar-16</td>
<td>Wed</td>
<td>Conference</td>
<td>Organoid approaches to study neural development</td>
<td>Mageson/Lassar</td>
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<tr>
<td>14-Mar-16</td>
<td>Mon</td>
<td>Spring Vacation</td>
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<tr>
<td>16-Mar-16</td>
<td>Wed</td>
<td>Spring Vacation</td>
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<tr>
<td>21-Mar-16</td>
<td>Mon</td>
<td>Lecture</td>
<td>Axonal connections</td>
<td>Flanagan</td>
</tr>
<tr>
<td>23-Mar-16</td>
<td>Wed</td>
<td>Conference</td>
<td>Axonal connections</td>
<td>Flanagan/Whited</td>
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<tr>
<td>28-Mar-16</td>
<td>Mon</td>
<td>Lecture</td>
<td>Skeletal muscle formation and regeneration</td>
<td>Lassar</td>
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<tr>
<td>30-Mar-16</td>
<td>Wed</td>
<td>Lecture</td>
<td>Limb patterning</td>
<td>Whited</td>
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<tr>
<td>4-Apr-16</td>
<td>Mon</td>
<td>Conference</td>
<td>Limb regeneration</td>
<td>Whited/Mageson</td>
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<tr>
<td>6-Apr-16</td>
<td>Wed</td>
<td>Student Presentations</td>
<td>Discussion rooms are reserved from 2-5</td>
<td>Whited/Yang</td>
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<td>Mageson/Lassar</td>
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**Principles of organogenesis, stem cells and regeneration**

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<thead>
<tr>
<th>Date</th>
<th>Day</th>
<th>Type</th>
<th>Title</th>
<th>Speaker(s)</th>
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<tr>
<td>11-Apr-16</td>
<td>Mon</td>
<td>Lecture</td>
<td>Chondrogenesis, Osteogenesis, and formation of the skeleton</td>
<td>Yang</td>
</tr>
<tr>
<td>13-Apr-16</td>
<td>Wed</td>
<td>Conference</td>
<td>Developmental diseases in skeletal biology</td>
<td>Yang/Whited</td>
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<tr>
<td>18-Apr-16</td>
<td>Mon</td>
<td>Lecture</td>
<td>Branching Morphogenesis, iPS cells and human disease</td>
<td>Rajagopal</td>
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<td>20-Apr-16</td>
<td>Wed</td>
<td>Lecture</td>
<td>Epithelial Regeneration and Cell plasticity</td>
<td>Rajagopal</td>
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<tr>
<td>25-Apr-16</td>
<td>Mon</td>
<td>Conference</td>
<td>Versatility of Notch signaling in tissue patterning</td>
<td>Rajagopal/Pourquie</td>
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<tr>
<td>27-Apr-16</td>
<td>Wed</td>
<td>Lecture</td>
<td>Urogenital Development and Sexual Differentiation</td>
<td>Kreidberg</td>
</tr>
<tr>
<td>Date</td>
<td>Day</td>
<td>Type</td>
<td>Title</td>
<td>Presenter(s)</td>
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<tr>
<td>2-May-16</td>
<td>Mon</td>
<td>Conference</td>
<td>Regulation in patterning, growth, and differentiation in the intestinal crypt</td>
<td>Kreidberg/Whited</td>
</tr>
<tr>
<td>4-May-16</td>
<td>Wed</td>
<td>Lecture</td>
<td>Embryological origins of the iPS revolution</td>
<td>Pourquie</td>
</tr>
<tr>
<td>9-May-16</td>
<td>Mon</td>
<td>Conference</td>
<td>Zen and the Art of Embryo Construction</td>
<td>Lassar and colleagues</td>
</tr>
<tr>
<td>11-May-16</td>
<td>Wed</td>
<td>Student presentations</td>
<td>Discussion rooms are reserved from 2-5</td>
<td>Rajagopal/Yang</td>
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</table>

Web site: [http://cb207.med.harvard.edu/](http://cb207.med.harvard.edu/)  
user name: cb207  
password: gastrula
Cell Biology 211 Molecular and Systems Level Cancer Cell Biology

Peter Sicinski, Jarrod Marto, and Marc Vidal updated in the course catalog

Units 4 Enrollment: Limited to 27, consent of instructor required.

Mon and Wed 1:00-2:30

Examines the molecular basis of cancer formation including alterations in signal transduction pathways, cell cycle machinery, and apoptosis. Describes novel systems biology proteomic approaches to study cancer cell signaling networks.

Note: Given alternate years with Cell Biology 212. Offered jointly with the Medical School as CB 704.0.

Prerequisite: General knowledge of biochemistry, molecular genetics, and cell biology.

Spring Session 2016
First Meeting: January 25, 2016
Final Meeting: April 27, 2016
Location: All lectures will be held in TMEC-250, except March 21, 2016 which is to be held in TMEC-227. All breakout discussions will be held in TMEC-316, TMEC-317 and TMEC-321.
Course Directors: Peter Sicinski, Peter_Sicinski@dfci.harvard.edu, Jarrod Marto, Jarrod_Marto@dfci.harvard.edu, and Marc Vidal, Marc_Vidal@dfci.harvard.edu
Curriculum Fellow: Megan Mittelstadt, megan_mittelstadt@hms.harvard.edu

Course Evaluation: 40% Presentation
40% Discussion
20% Participation & Attendance

Important Notes:
- Students are expected to attend all lectures and sessions. Please be on time.
- Ask questions – we want to make this a dynamic learning experience.
- Papers will be posted for each module under “Prep Readings” on the course isite. Students are responsible for this material by lecture 1 of each module. Assignments for session 3 of each module will be posted under “Paper Presentations” and should be prepared prior to session 3.

Participation/Attendance (20%): Attendance and participation at all course sessions is required and necessary for your success in the course. Excused absences are allowed only at the discretion of the course directors. Students are expected to contribute actively to each class meeting by asking and answering questions of the lecturers and during student presentations. In the event that the university cancels classes, such as for severe weather, students are expected to continue with readings as originally scheduled, unless other instructions are posted at the course website.
or communicated via email.

**Presentation Guidelines (40%):** Student presentations give you the opportunity to present an additional topic related to the lectures given by faculty. This will allow you to synthesize and implement the knowledge that you have gained while practicing your presentation skills. Each student presentation will explore a specific topic of cancer biology research in depth, as outlined in the schedule. Students will be able to choose their preferred topic and date. Student presentations will occur during the third session of each module, when the class will be divided into sections of 6-8 students. Lecturers, postdocs from lecturers’ labs, and/or course directors, will moderate sections. The presenting student will run the session, providing a presentation of their research paper and topic followed by a discussion session.

- Students will be expected to give a powerpoint presentation and lead a discussion of the paper with their classmates.
- Each student is asked to make a ~30-minute presentation of the paper and topic plus time for discussion.
- The presentation should strive to be a clear, concise, and interesting.

The presentation should include:
1. Background Information on the topic
2. Hypothesis / Objectives / Aims of the authors of the assigned paper
3. Key Figures and Results (note: it is not necessary to present each figure)
4. Conclusion
5. Next Steps/Future Directions – i.e. if you were to continue these studies, what direction of research would you propose?
6. Discussion Questions (3-5) – these can be presented throughout or just at the end

Each student will receive written feedback on their presentation skills from the moderator that facilitated their session.

**Discussion Guidelines (40%):** Students are expected to come prepared to small group sessions, participate fully in the discussions, and to critically think through the posed discussion questions as a group. Ideally, all students will contribute equally to these sessions. When everyone contributes, regardless of background, some of the most interesting and dynamic discussion can arise.
<table>
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<tr>
<th>Lecture</th>
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<th>Faculty</th>
<th>Topic/Lecture Title</th>
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<tr>
<td>1</td>
<td>Monday Jan 25</td>
<td>P. Sicinski, M. Mittelstadt</td>
<td>Course Introduction</td>
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<td>Part 1: Signaling Networks and Cellular Behavior</td>
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<td>2</td>
<td>Wednesday Jan 27</td>
<td>C. Stiles</td>
<td>Module 1: Signal Transduction</td>
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<tr>
<td>3</td>
<td>Monday Feb 1</td>
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<td>Module 1: Signal Transduction</td>
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<td>4</td>
<td>Wednesday Feb 3</td>
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<td>Module 1: Signal Transduction</td>
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<td>5</td>
<td>Monday Feb 8</td>
<td>P. Sicinski</td>
<td>Module 2: Cell Cycle</td>
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<tr>
<td>6</td>
<td>Wednesday Feb 10</td>
<td></td>
<td>Module 2: Cell Cycle</td>
</tr>
<tr>
<td>7</td>
<td>Wednesday Feb 17</td>
<td></td>
<td>Module 2: Cell Cycle</td>
</tr>
<tr>
<td>8</td>
<td>Monday Feb 22</td>
<td>K. Wucherpfennig</td>
<td>Module 3: Immune Therapy in Cancer</td>
</tr>
<tr>
<td>9</td>
<td>Wednesday Feb 24</td>
<td></td>
<td>Module 3: Immune Therapy in Cancer</td>
</tr>
<tr>
<td>10</td>
<td>Monday Feb 29</td>
<td></td>
<td>Module 3: Immune Therapy in Cancer</td>
</tr>
<tr>
<td>11</td>
<td>Wednesday Mar 2</td>
<td>N. Gray</td>
<td>Module 7: Chemical Biology of the Cell</td>
</tr>
<tr>
<td>12</td>
<td>Monday Mar 7</td>
<td></td>
<td>Module 7: Chemical Biology of the Cell</td>
</tr>
<tr>
<td>13</td>
<td>Wednesday Mar 9</td>
<td></td>
<td>Module 7: Chemical Biology of the Cell</td>
</tr>
<tr>
<td></td>
<td>Monday Mar 14</td>
<td>President’s Day – No Classes</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Wednesday Mar 16</td>
<td>Spring Break – No Classes</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Part 2: Omics and Biological Systems Analysis</td>
</tr>
<tr>
<td>14</td>
<td>Monday Mar 21</td>
<td>R. Beroukhim</td>
<td>Module 6: Analysis of Cancer Genomics</td>
</tr>
<tr>
<td>15</td>
<td>Wednesday Mar 23</td>
<td></td>
<td>Module 6: Analysis of Cancer Genomics</td>
</tr>
<tr>
<td>16</td>
<td>Monday Mar 28</td>
<td></td>
<td>Module 6: Analysis of Cancer Genomics</td>
</tr>
<tr>
<td>17</td>
<td>Wednesday Mar 30</td>
<td>M. Vidal</td>
<td>Module 4: Cancer Cell Interactomes</td>
</tr>
<tr>
<td>18</td>
<td>Monday Apr 4</td>
<td></td>
<td>Module 4: Cancer Cell Interactomes</td>
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<tr>
<td>19</td>
<td>Wednesday Apr 6</td>
<td></td>
<td>Module 4: Cancer Cell Interactomes</td>
</tr>
<tr>
<td>20</td>
<td>Monday Apr 11</td>
<td>J. Marto</td>
<td>Module 5: Functional Proteomics</td>
</tr>
<tr>
<td>21</td>
<td>Wednesday Apr 13</td>
<td></td>
<td>Module 5: Functional Proteomics</td>
</tr>
<tr>
<td></td>
<td>Monday Apr 18</td>
<td>Patriot’s Day – No Classes – No journal club for J. Marto’s Module 5</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>Wednesday Apr 20</td>
<td>S. Gaudet</td>
<td>Module 8: Cancer Systems Biology</td>
</tr>
<tr>
<td>23</td>
<td>Monday Apr 25</td>
<td></td>
<td>Module 8: Cancer Systems Biology</td>
</tr>
<tr>
<td>24</td>
<td>Wednesday Apr 27</td>
<td></td>
<td>Module 8: Cancer Systems Biology</td>
</tr>
</tbody>
</table>

Module Descriptions

Module 1: Signal Transduction  C. Stiles
The genes that regulate cell division, differentiation or death are controlled by factors that bind to specific, high affinity receptors on the outer cell surface. How does information flow from these cell surface receptors to the nucleus so as to regulate gene expression? In this module, Dr. Stiles discusses basic principles of the signal transduction process that can be applied to a wide range of the signaling pathways that, when perturbed, give rise to cancer.

**Module 2: Cell Cycle and Apoptosis**

P. Sicinski

The core cell cycle machinery drives proliferation of mammalian cells. Mutations within this machinery play a causative role in a large number of human cancers. Dr. Sicinski will review how this cell cycle machinery operates in normal cells, and how its abnormal expression leads to cancer. Dr. Sicinski will also discuss the utility of targeting cell cycle proteins in cancer treatment.

**Module 3: Immune Therapy in Cancer**

K. Wucherpfennig

The immune system has the ability to specifically detect and eliminate transformed cells, but this protective mechanism is frequently undermined by a number of immunosuppressive factors in the tumor microenvironment. Dr. Wucherpfennig will review the different cellular and molecular mechanisms through which immune cells can eliminate transformed cells. Furthermore, he will discuss exciting results from recent clinical trials, which have shown that immunotherapies can induce durable responses in patients with metastatic disease.

**Module 4: Chemical Biology of the Cancer Cell**

N. Gray

Small molecules provide a powerful means to interrogate biological systems and provide potential 'lead' compounds for further development. The Gray lectures will describe strategies for identifying, characterizing and exploiting small molecules to elucidate new cancer biology.

**Module 5: Analysis of Cancer Genomics**

R. Beroukhim

Recent technological advances have enabled the study of molecular features of cancer on a genome-wide scale. Dr. Beroukhim, an expert in cancer genomics, will lead this section of the course focusing on important applications of genomic technologies and challenges that need to be addressed.

**Module 6: Cancer Cell Interactomes**

M. Vidal

Complex networks or systems of dynamically interacting macromolecules mediate most, if not all, cellular functions. Cellular systems exhibit global and emergent properties that are not necessarily obvious from observing one or a few genes or gene products at a time. This module will cover how the properties of cellular systems might be perturbed in cancer.

**Module 7: Functional Genomics and Proteomics**

J. Marto
Recent advances in numerous technologies now support genome-wide manipulation (overexpression or depletion constructs) and measurement (mass spectrometry) of proteins. In this module, Dr. Marto will discuss the use of these genome-scale approaches to interrogate cellular response to gain- and loss-of-function mutations in cancer.

Module 8: Cancer Systems Biology  
S. Gaudet

How much and what kind of information do we need to know about a cell to predict its response to stimuli such as growth factors, cytokines or drugs? Dr. Gaudet will discuss different systems-level approaches that aim to better understand cancer cell biology and to assist in identification of drug targets and in drug design.

The schedule, policies, and assignments in this course are subject to change in the event of extenuating circumstances, by mutual agreement, and/or to ensure better student learning.
Developmental and Regenerative Biology

**DRB 331 Critical Analysis and Experimental Approaches in Developmental and Regenerative Biology** [January Session Course]
David Van Vactor and Ya-Chieh Hsu

4 Units Enrollment: Limited to 15, consent of instructor required.

**Mon-Sat 10:00-6:00** (Please note that the first day includes a one-time introductory meeting at 9 a.m.)

This introductory level course will provide a rapid survey of major topics and themes in developmental and regenerative biology in parallel with hands-on exposure to a variety of experimental approaches, technologies and model systems (*Drosophila*, *C. elegans*, Axolotl, mouse and human cell lines). The course is designed to offer an intense immersion or primer that will better prepare students for subsequent semester-long courses such as CB207 and NB207. Students will be required to prepare and lead a research discussion section on assigned reading where they provide an analysis of experimental design and methodology relevant to the lab that afternoon. Additionally, students will be required to write an NIH-format research fellowship proposal describing their own plan to use methods/systems presented in the course to address a cutting edge question in the field. The writing assignment will be assessed based on depth and breadth of scholarship, effective experimental design, and a thorough description of quantitative and statistical methods for rigorous data analysis. Students will be asked to defend the proposal in a brief oral chalk talk presentation to course faculty after referees have read and evaluated the proposal.

**Note:** Open to first-year and second-year BBS students; Not repeatable for credit. This course is designed to run concurrently with the 2-unit course DRB330QC. Students have the option of enrolling in DRB330QC instead to complete fewer assignments and earn one quarter credit only.

**January Session 2016**
**Meeting Dates:** January 4, 2016 to January 19, 2016
**First Meeting:** Monday, January 4, 2016
**Final Meeting:** Tuesday, January 19, 2016
**Location:** Varies. Schedule below.
**Course Heads:** David Van Vactor, davie@hms.harvard.edu, and Ya-chieh Hsu, yachieh_hsu@harvard.edu
**Curriculum Fellow:** Ted Feldman, tfeldman@fas.harvard.edu
<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Lecture/Lab Activity (Faculty)</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/04</td>
<td>9 AM</td>
<td>Course Introduction &amp; Overview (David Van Vactor, Ya-Chieh Hsu and Ted Feldman)</td>
<td>TMEC 446</td>
</tr>
<tr>
<td></td>
<td>10 AM</td>
<td>Lecture: Transcriptome Regulation During Development (John Rinn/HSCRB)</td>
<td></td>
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<tr>
<td></td>
<td>1 PM</td>
<td>Lab:</td>
<td></td>
</tr>
<tr>
<td>1/05</td>
<td>10 AM</td>
<td>Lecture: An introduction to light microscopy (Doug Richardson/HCB1)</td>
<td>TMEC 446</td>
</tr>
<tr>
<td></td>
<td>1 PM</td>
<td>Lab: Confocal, transmitted and fluorescence microscopy</td>
<td>Sherman Fairchild</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Building G62</td>
</tr>
<tr>
<td>1/06</td>
<td>10 AM</td>
<td>Lecture: Mammalian Skin and Hair Follicle Regeneration (Ya-Chieh Hsu/HSCRB)</td>
<td>Building G62</td>
</tr>
<tr>
<td></td>
<td>1 PM</td>
<td>Lab:</td>
<td></td>
</tr>
<tr>
<td>1/07</td>
<td>10 AM</td>
<td>Lecture: Development &amp; Regeneration of the Cerbral Cortex (JeffreyMacklis/HSCRB)</td>
<td>Sherman Fairchild</td>
</tr>
<tr>
<td></td>
<td>1 PM</td>
<td>Lab:</td>
<td>Building G62</td>
</tr>
<tr>
<td>1/08</td>
<td>10 AM</td>
<td>Lecture: Development of Olfactory Connectivity in mouse (Steve Liberles/ HMS-Cell Biology)</td>
<td>TMEC 227 Mini</td>
</tr>
<tr>
<td></td>
<td>1 PM</td>
<td>Lab:</td>
<td>Amphitheater</td>
</tr>
<tr>
<td>1/09</td>
<td>10 AM</td>
<td>Lecture: Zebrafish organogenesis- the hematovascular &amp; Systems hepatobiliary (Trista North &amp; Wolfram Goessling)</td>
<td>Modell 100A Fred S. Rosen Lecture Hall</td>
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<tr>
<td></td>
<td>1 PM</td>
<td>Lab:</td>
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<tr>
<td>1/10</td>
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<td><strong>D A Y  O F F</strong>---------------------------------------------------------------------------------------</td>
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<tr>
<td>1/11</td>
<td>10 AM</td>
<td>Lecture: Synapse Development, Plasticity and Degeneration Models (David Van Vactor/HMS-Cell Biology)</td>
<td>TMEC 250 Mini</td>
</tr>
<tr>
<td></td>
<td>1 PM</td>
<td>Lab: Analysis of Synapse Plasticity and Morphogenesis</td>
<td>Amphitheater</td>
</tr>
<tr>
<td>1/12</td>
<td>10 AM</td>
<td>Lecture: Forming accurate neural connections in Drosophila (Matt Pecot/HMS-Neurobiology)</td>
<td>TMEC 250 Mini</td>
</tr>
<tr>
<td></td>
<td>1 PM</td>
<td>Lab:</td>
<td>Amphitheater</td>
</tr>
<tr>
<td>1/13</td>
<td>10 AM</td>
<td>Lecture: Mechanisms of Heritable Epigenetics in C. elegans (Eric Greer/Department of Pediatrics; Boston Children’s Hospital)</td>
<td>TMEC 446</td>
</tr>
<tr>
<td></td>
<td>1 PM</td>
<td>Lab:</td>
<td>Conference room</td>
</tr>
<tr>
<td>1/14</td>
<td>10 AM</td>
<td>Lecture: Connective Tissue Development and Regeneration in Zebrafish (Jenna Galloway; Dept of Orthopedics; MGH)</td>
<td>TBA</td>
</tr>
<tr>
<td></td>
<td>1 PM</td>
<td>Lab:</td>
<td></td>
</tr>
<tr>
<td>1/15</td>
<td>10 AM</td>
<td>Lecture: Techniques for studying axolotl limb regeneration (Jessica Whited; Dept of Orthopedic Surgery; BWH)</td>
<td>TBA</td>
</tr>
<tr>
<td></td>
<td>1 PM</td>
<td>Lab:</td>
<td></td>
</tr>
<tr>
<td>1/16</td>
<td>10 AM</td>
<td>Lecture: Synapse Development, Plasticity and Degeneration Models (David Van Vactor/HMS-Cell Biology)</td>
<td>Modell 100A Fred S. Rosen Lecture Hall</td>
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</tbody>
</table>
1 PM Lab:

6pm **DRB Program Winter Party**

1/17 **Day OFF**

1/18 10 AM Lecture: Mammalian airways regeneration and IPS approaches to lung disease (Jay Rajagopal /MGH)

1 PM Lab:

1/19 10 AM Lecture: Tissue Morphogenesis and Polarity in Organoid Cultures (Senthil Muthuswamy; BIDMC and Cell Biology)

1PM Lab:

6 PM **DRB Program Membership Advising Reception: LHRRB 313**

(David Van Vactor, John Rinn & Ted Feldman)
Genetics

Genetics 202 Human Genetics
Matthew Warman

4 Units Enrollment: Limited to 20, consent of instructor required.

Wed 2:00-5:00

This course examines genetic principles and experimental approaches for addressing fundamental questions about human variation, history, health, and disease. Each session is comprised of a lecture and a class discussion. Each lecture introduces a new topic while the class discussion addresses the previous week’s lecture topic and solidifies knowledge about that topic through the critical reading and analysis of research and review articles. Class discussions utilize different types of source materials that are recommended by each lecturer. These materials will typically include a review article and a current article in that field. Additionally, two problem sets will be assigned over the course of the semester. These assignments will give students the opportunity to apply the concepts from the lecture and class discussion and get experience using tools critical to the study of human genetics. The knowledge and practical skills gained from this course will be applicable for many other lines of scientific inquiry.

Prerequisites: Genetics 201 or permission of the Course Director.

Spring Session 2016
First Meeting: Wednesday, January 27, 2016
Final Meeting: Wednesday, April 27, 2016
Location: Lectures will be held in TMEC-447 (except March 9, in TMEC-445). All tutorials will be held in TMEC-336.
Course Head: Matthew Warman, Matthew.Warman@childrens.harvard.edu
Curriculum Fellow: Emily Gleason, emily_gleason@hms.harvard.edu
Teaching Assistant: Michael Guo, michaelguo@fas.harvard.edu

Grades
Because this class focuses on distinct lectures that cover very specific topics of human genetic research, and utilizes discussion sessions to discuss and elaborate on these topics, attendance and active participation at ALL class meetings is crucial. At each class session, two papers will be assigned for reading and discussion the following week. Please read the assigned papers before coming to class. After class you will receive a grade and feedback for your participation in that discussion session. Additionally, two problem sets will be assigned that will highlight key concepts and methods important to the study of human genetics.

Grades for the course will be calculated as follows:

| Attendance/Participation at class sessions: | 50% |
| Problem Sets: |        |
| Problem Set 1 (due 3/23) | 25% |
| Problem Set 2 (due 5/4) | 25% |
## Attendance Policy
Attendance and active participation at ALL class meetings is crucial. If you are unable to attend class, you are expected to contact the course instructors as soon as possible to make arrangements for your absence. Students will be expected to complete makeup assignments for any missed classes. Students may take up to two excused absences with permission from the course instructors. Three or more absences will result in a failing grade in the class.

### Genetics 202: Human Genetics
**Spring 2016 Class Schedule**

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Activity</th>
<th>Lecturer</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>January 27th</td>
<td>2pm – 3:20pm</td>
<td>Lecture</td>
<td>Steve McCarroll</td>
<td>Human Genetics in an Era of Abundant Data</td>
</tr>
<tr>
<td></td>
<td>3:40pm – 5pm</td>
<td>Tutorial</td>
<td>Michael Guo</td>
<td>Introduction to Databases and Algorithms</td>
</tr>
<tr>
<td>February 3rd</td>
<td>2pm – 3:20pm</td>
<td>Lecture</td>
<td>Matt Warman</td>
<td>Mendelian Diseases</td>
</tr>
<tr>
<td></td>
<td>3:40pm – 5pm</td>
<td>Paper Discussion</td>
<td>(McCarroll)</td>
<td></td>
</tr>
<tr>
<td>February 10th</td>
<td>2pm – 3:20pm</td>
<td>Paper Discussion</td>
<td>Joel Hirschhorn</td>
<td>Complex Traits in Populations</td>
</tr>
<tr>
<td></td>
<td>3:40pm – 5pm</td>
<td>Paper Discussion</td>
<td>(Warman)</td>
<td></td>
</tr>
<tr>
<td>February 17th</td>
<td>2pm – 3:20pm</td>
<td>Lecture</td>
<td>Cynthia Morton</td>
<td>Chromosomal Disorders</td>
</tr>
<tr>
<td></td>
<td>3:40pm – 5pm</td>
<td>Paper Discussion</td>
<td>(Hirschhorn)</td>
<td></td>
</tr>
<tr>
<td>February 24th</td>
<td>2pm – 3:20pm</td>
<td>Lecture</td>
<td>Elinor Karlsson, University of Massachusetts Medical School</td>
<td>Human Evolution and Migration</td>
</tr>
<tr>
<td></td>
<td>3:40pm – 5pm</td>
<td>Paper Discussion</td>
<td>(Karlsson)</td>
<td></td>
</tr>
<tr>
<td>March 2nd</td>
<td>2pm – 3:20pm</td>
<td>Lecture</td>
<td>Pontus Skoglund and Iain Mathieson, Reich Lab</td>
<td>Ancient DNA and Human Pre-History</td>
</tr>
<tr>
<td></td>
<td>3:40pm – 5pm</td>
<td>Paper Discussion</td>
<td>(Karlsson)</td>
<td></td>
</tr>
<tr>
<td>March 9th</td>
<td>2pm – 3:20pm</td>
<td>Lecture</td>
<td>Frederick R. Bieber</td>
<td>Forensic Genetics</td>
</tr>
<tr>
<td></td>
<td>3:40pm – 5pm</td>
<td>Paper Discussion</td>
<td>(Skoglund and Mathieson)</td>
<td></td>
</tr>
<tr>
<td>March 16th</td>
<td>No Class – Spring Break</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>March 23rd</td>
<td>Problem Set 1 Due by 2pm</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>2pm – 3:20pm</td>
<td>Paper Discussion</td>
<td>(Bieber)</td>
<td>Personal Genomes</td>
</tr>
<tr>
<td></td>
<td>3:40pm – 5pm</td>
<td>Lecture</td>
<td>George Church</td>
<td></td>
</tr>
<tr>
<td>March 30th</td>
<td>2pm – 3:20pm</td>
<td>Paper Discussion</td>
<td>(Church)</td>
<td>Genomics and Health Outcomes</td>
</tr>
<tr>
<td></td>
<td>3:40pm – 5pm</td>
<td>Lecture</td>
<td>Robert Green</td>
<td></td>
</tr>
<tr>
<td>April 6th</td>
<td>2pm – 3:20pm</td>
<td>Lecture</td>
<td>David Miller</td>
<td>Genetic Testing and Counseling</td>
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<tr>
<td></td>
<td>3:40pm – 5pm</td>
<td>Paper Discussion</td>
<td>(Green)</td>
<td></td>
</tr>
<tr>
<td>April 13th</td>
<td>2pm – 3:20pm</td>
<td>Paper Discussion</td>
<td>(Miller)</td>
<td>Cancer Genetics</td>
</tr>
<tr>
<td></td>
<td>3:40pm – 5pm</td>
<td>Lecture</td>
<td>Todd Golub</td>
<td></td>
</tr>
<tr>
<td>April 20th</td>
<td>2pm – 3:20pm</td>
<td>Lecture</td>
<td>Christine Seidman</td>
<td>Cardiovascular Genetics</td>
</tr>
<tr>
<td></td>
<td>3:40pm – 5pm</td>
<td>Paper Discussion</td>
<td>(Golub)</td>
<td></td>
</tr>
<tr>
<td>April 27th</td>
<td>2pm – 3:20pm</td>
<td>Paper Discussion</td>
<td>(Seidman)</td>
<td>Genetics of Autism</td>
</tr>
<tr>
<td></td>
<td>3:40pm – 5pm</td>
<td>Lecture</td>
<td>Mark Daly</td>
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</tr>
<tr>
<td>May 4th</td>
<td>Problem Set 2 Due by 5pm</td>
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</table>

23
Genetics 216 Advanced Topics in Gene Expression [BCMP 310qc, Eukaryotic Gene Regulation, has been merged into Genetics 216.] (Updated)

Fred Winston, Robert Kingston, and Stephen Buratowski

4 Units Enrollment: Limited to 16, consent of instructor required.

Tue 2:00-5:00

Covers both biochemical and genetic studies in regulatory mechanisms. Small number of topics discussed in depth, using the primary literature. Topics range from prokaryotic transcription to eukaryotic development. All students taking Genetics 216 should read and be prepared to discuss the three papers for the first meeting on January 26. The readings can be downloaded from the course web site.

Course Notes: Offered jointly with the Medical School as GN 703.0.

Prerequisite: Genetics 201 and BCMP 200 or equivalent

Spring 2016

First Meeting: Tuesday, January 26, 2016

Final Meeting: Tuesday, May 3, 2016

Location: TMEC 128

Course Head: Fred Winston, winston@genetics.med.harvard.edu

Course Instructors: Robert Kingston, kingston@molbio.mgh.harvard.edu, and Stephen Buratowski, steve_buratowski@hms.harvard.edu

Genetics 216 Spring 2016 Class Schedule

<table>
<thead>
<tr>
<th>Date</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/26/16</td>
<td>course introduction; CRISPR</td>
</tr>
<tr>
<td>2/2/16</td>
<td>CRISPR</td>
</tr>
<tr>
<td>2/9/16</td>
<td>silencing I</td>
</tr>
<tr>
<td>2/16/16</td>
<td>silencing II</td>
</tr>
<tr>
<td>2/23/16</td>
<td>no class</td>
</tr>
<tr>
<td>3/1/16</td>
<td>microRNAs</td>
</tr>
<tr>
<td>3/8/16</td>
<td>Xist and X inactivation</td>
</tr>
<tr>
<td>3/15/16</td>
<td>spring break</td>
</tr>
<tr>
<td>3/22/16</td>
<td>eukaryotic transcriptional activation</td>
</tr>
<tr>
<td>3/29/16</td>
<td>transcription elongation topic proposals due</td>
</tr>
<tr>
<td>4/5/16</td>
<td>D. melanogaster sex determination</td>
</tr>
<tr>
<td>4/12/16</td>
<td>olfactory receptors how to give a talk</td>
</tr>
<tr>
<td>4/19/16</td>
<td>student presentations</td>
</tr>
<tr>
<td>4/26/16</td>
<td>student presentations</td>
</tr>
<tr>
<td>5/3/16</td>
<td>student presentations</td>
</tr>
</tbody>
</table>
Genetics 219. Inheritance and Weird Stuff — Will not be offered Spring ‘16
Chao-Ting Wu

Units 4

Tue 11:00-2:00

Focus on patterns of inheritance, including those that were once considered extraordinary but are now recognized as paradigms spanning fungi to humans. Expectations: questions, ideas, conversation during class. No tests, problem sets, or papers.

Course Notes: Primarily for first-year graduate students, but is open to medical students and advanced undergraduates. A basic understanding of genetics recommended.
Genetics 228 Genetics in Medicine - From Bench to Bedside
Christopher Newton-Cheh and David Sweetser

4 Units Enrollment: Limited to 30, consent of instructor required.

Fri 2:00-5:00

Focus on translational medicine: the application of basic genetic discoveries to human disease. Will discuss specific genetic disorders and the approaches currently used to speed the transfer of knowledge from the laboratory to the clinic. The three-hour sessions include a patient interview and student led journal club in addition to lectures.

Course Notes: Course will include patient presentations and lectures by investigators known for their work in a specific disease area. Course will be held at MGH (transportation provided to MGH). Offered jointly with the Medical School as GN 711.0. For more information visit http://www2.massgeneral.org/bbs/gen228/gen228.htm

Spring 2016
First Meeting: Friday, January 29, 2016
Final Meeting: Friday, April 22, 2016
Location: Simches Research Center, Room 3.120, 185 Cambridge St., Boston, MA 02114
Course Head: Christopher Newton-Cheh, CNEWTONCHEH@mgh.harvard.edu
Course Instructors: David Sweetser, DSWEETSER@mgh.harvard.edu
Human Biology and Translational Medicine

HBTM 200: Principles and Practice of Human Pathology
Scott Lovitch

4 Units

**Tue 9:00-11:00 and Th 9:00-1:00**

This course provides a comprehensive overview of human pathology with emphasis on mechanisms of disease and modern diagnostic technologies. Topics include (1) general mechanisms of disease (inflammation, infection, immune injury, host response to foreign materials, transplantation, genetic disorders and neoplasia), (2) pathology of major organ systems, and (3) review of diagnostic tools from invasive surgical pathology to non-invasive techniques such as diagnostic imaging and molecular pathology. The objectives of this course are achieved through a set of integrated lectures and laboratories, as well as a student-driven term project leading to a formal presentation on a medical, socioeconomic, or technological issue in human pathology.

**Course Notes**: Enrollment may be limited. Jointly offered with HMS as HT035.0.

**Prerequisites**: General biology.

**Spring 2016**
**First Meeting**: Tuesday, February 2, 2016
**Final Meeting**: Thursday, May 12, 2016
**Location**: TMEC-333; labs in TMEC 2nd floor skills area
**Course Head**: Scott Lovitch, slovitch@partners.org
**Teaching Assistants**: Amanda Martinot (amartino@bidmc.harvard.edu); Janice Nieves-Bonilla (jnievesbonilla@g.harvard.edu)
**Course Website**: [https://canvas.harvard.edu/courses/8871](https://canvas.harvard.edu/courses/8871)

**Course Evaluation:**

- **Lab/Class Participation (20%)**: Participation in lectures and laboratories is essential component of the course. Class participation is measured in the form of attendance in lectures and labs, as well as participation in class discussions.
- **Problem Sets (30%)**: There will be three assigned throughout the course. Problem sets are designed to help you master course material.
- **Final presentation (50%)**: Each student will be required to conduct an independent, literature-based study on a topic related to diagnostic medicine or mechanisms of disease, and present his or her findings in an approximately 30-minute presentation to the class. Students are encouraged to test and challenge established dogmas or practices in all aspects
of pathology and diagnostic medicine, and to try to provide new or alternative solutions. Grading of presentations will be based on knowledge of pathology, application of diagnostic technique, significance/relevance/creativity, and presentation (clarity, timing).

Spring 2016 Class Schedule:

<table>
<thead>
<tr>
<th>Date/Time</th>
<th>Topic</th>
<th>Instructor</th>
<th>Room</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tues Feb 2</td>
<td>Cell Injury and Adaptation, and the Host Response to Cell Death</td>
<td>Mitchell</td>
<td>TMEC 333</td>
</tr>
<tr>
<td>Thurs Feb 4</td>
<td>Tissue Injury and Repair</td>
<td>Mitchell</td>
<td>TMEC 333</td>
</tr>
<tr>
<td></td>
<td>Lab: Cellular and Tissue Response to Injury</td>
<td>Mitchell/Padera</td>
<td>TMEC 202-3/6/7</td>
</tr>
<tr>
<td>Tues Feb 9</td>
<td>Pathology of Cancer I</td>
<td>Brachtel</td>
<td>TMEC 333</td>
</tr>
<tr>
<td>Thurs Feb 11</td>
<td>Pathology of Cancer II</td>
<td>Brachtel</td>
<td>TMEC 333</td>
</tr>
<tr>
<td></td>
<td>Lab: Pathology of Cancer</td>
<td>Brachtel</td>
<td>TMEC 202-3/6/7</td>
</tr>
<tr>
<td>Tues Feb 16</td>
<td>Student Presentations: Orientation and Assignment of Dates/Times</td>
<td>Lovitch</td>
<td>TMEC 333</td>
</tr>
<tr>
<td></td>
<td>Treatment and Management of Inflammatory Bowel Disease <em>(Student Presentation from 2015)</em></td>
<td>Nieves-Bonilla</td>
<td>TMEC 333</td>
</tr>
<tr>
<td></td>
<td>Animal Models of Human Disease</td>
<td>Martinot</td>
<td>TMEC 333</td>
</tr>
<tr>
<td>Thurs Feb 18</td>
<td>Hematopoiesis, Hematology and Heme Malignancies</td>
<td>Lovitch</td>
<td>TMEC 333</td>
</tr>
<tr>
<td></td>
<td>Tour of BWH Pathology Department</td>
<td></td>
<td>Meet in TMEC 333</td>
</tr>
<tr>
<td>Tues Feb 23</td>
<td>Neuropathology of Cancer</td>
<td>Pfannl</td>
<td>TMEC 333</td>
</tr>
<tr>
<td>Thurs Feb 25</td>
<td>Hematopoietic Stem Cells and Transfusion Medicine</td>
<td>Chai</td>
<td>TMEC 333</td>
</tr>
<tr>
<td></td>
<td>Lab: Neuropathology</td>
<td>Pfannl</td>
<td>TMEC 202-3/6/7</td>
</tr>
</tbody>
</table>
### Tues March 1
9-11  Pathology of Infectious Disease  Milner  TMEC 333

### Thurs March 3
9-11  Pathology of the Reproductive System  Gupta  TMEC 333
11-1  Lab: Infectious Disease and Clinical Microbiology  Milner  TMEC 202-3/6/7

### Tues March 8
9-11  Pathology of the Urinary Tract  Gupta  TMEC 333
11-12:30  Optional Lecture: Immunology Boot Camp  Anthony  TMEC 333

### Thurs March 10
9-11  Developmental Neuropathology  Golden  TMEC 333
11-1  Lab: Reproductive and Genitourinary Pathology  Gupta  TMEC 202-3/6/7

### March 12-20 Harvard Spring Break – No Class

### Tues March 22
9-11  Vascular Endothelial Dysfunction and Atherosclerosis  Gimbrone  TMEC 333

### Thurs March 24
9-11  Molecular Pathology  Loda  TMEC 333
11-1  Tour of Center for Advanced Molecular Diagnostics at BWH  Meet in TMEC 333

### Tues March 29
9-11  GI Pathology I: Alimentary Tract  Glickman  TMEC 333
11-1  Review #2: Transfusion Medicine, Atherosclerosis, Neuro/GYN/GU/GI Pathology, Molecular Diagnostics  Martinot  TMEC 333

### Thurs March 31
9-11  GI Pathology II: Liver, Biliary Tract and Pancreas  Glickman  TMEC 333
11-1  Lab: GI Pathology  Glickman  TMEC 202-3/6/7

### SUNDAY, APRIL 3: PROBLEM SET #2 DUE ELECTRONICALLY BY 11:59 PM
<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Activity</th>
<th>Faculty</th>
<th>Location</th>
</tr>
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<tbody>
<tr>
<td>Tues April 5</td>
<td>9-11</td>
<td>Cardiovascular Pathology</td>
<td>Padera</td>
<td>TMEC 333</td>
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<tr>
<td>Thurs April 7</td>
<td>9-11</td>
<td>Pulmonary Pathology</td>
<td>Padera</td>
<td>TMEC 333</td>
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<tr>
<td></td>
<td>11-1</td>
<td>Lab: Cardiovascular and Pulmonary Pathology</td>
<td>Padera</td>
<td>TMEC 202-3/6/7</td>
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<tr>
<td>Tues April 12</td>
<td>9-11</td>
<td>Cytogenetics and Cytogenomics</td>
<td>Ligon</td>
<td>TMEC 333</td>
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<tr>
<td>Thurs April 14</td>
<td>9-11</td>
<td>Next-Generation Sequencing and Personalized Medicine</td>
<td>Sholl</td>
<td>TMEC 333</td>
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<tr>
<td></td>
<td>11-1</td>
<td>Cadaver Lab #1</td>
<td>Greenhouse/Giatsidis</td>
<td>TMEC Morgue</td>
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<tr>
<td>Tues April 19</td>
<td>9-11</td>
<td>Biomaterials and Implantable Devices: Mechanisms, Challenges, and Opportunities for Research and Innovation</td>
<td>Schoen</td>
<td>TMEC 333</td>
</tr>
<tr>
<td>Thurs April 21</td>
<td>9-11</td>
<td>In Vivo Histology: Non-Invasive Diagnostic Imaging</td>
<td>Tearney</td>
<td>TMEC 333</td>
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<td>11-1</td>
<td>Cadaver Lab #2</td>
<td>Anderson/Giatsidis</td>
<td>TMEC Morgue</td>
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<tr>
<td>Tues April 26</td>
<td>9-11</td>
<td>Forensic Pathology</td>
<td>Springer</td>
<td>TMEC 333</td>
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<td>11-1</td>
<td><strong>Review #3: GI, Cardiovascular and Pulmonary Pathology, Cytogenetics, Proteomics, NGS, Biomaterials, Forensic Pathology</strong></td>
<td>Martinot/Nieves-Bonilla</td>
<td>TMEC 333</td>
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<td>Thurs April 28</td>
<td>9-11</td>
<td><strong>Student Presentations</strong></td>
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<td>11-1</td>
<td><strong>Student Presentations</strong></td>
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<td><strong>SUNDAY, MAY 1: PROBLEM SET #3 DUE ELECTRONICALLY BY 11:59 PM</strong></td>
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<tr>
<td>Tues May 3</td>
<td>9-11</td>
<td>Proteomics</td>
<td>Marto</td>
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<tr>
<td>Thurs May 5</td>
<td>9-10</td>
<td>Global Pathology</td>
<td>Roberts</td>
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<td>10-11</td>
<td><strong>Student Presentations</strong></td>
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<td>TMEC 333</td>
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<td></td>
<td>11-1</td>
<td>Bovine Heart Dissection Lab</td>
<td>Padera/Martinot</td>
<td>TMEC 202-3/6/7</td>
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<tr>
<td>Tues May 10</td>
<td>Student Presentations</td>
<td>TMEC 333</td>
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<td>9-11</td>
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<tr>
<td>Thurs May 12</td>
<td>Student Presentations</td>
<td>TMEC 333</td>
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<td>9-11</td>
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<tr>
<td>11-12:30</td>
<td>Student Presentations (if needed)</td>
<td>TMEC 333</td>
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<tr>
<td>12:30-1</td>
<td>Concluding Remarks from Course Director</td>
<td>Lovitch</td>
<td>TMEC 333</td>
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</tbody>
</table>
Immunology

**Immunology 202 Immune and Inflammatory Diseases (Updated)**
*Filip Swirski and Mikael Pittet*

4 Units

**Tue and Th 1:30-4:00 (Lecture: 1:30-2:30 Break: 2:30-2:45 Discussion: 2:45-4:00)**

IMM202 builds on IMM201 and explores fundamental principles of immunology in the context of immune and inflammatory diseases. Through a series of lectures and discussion, students will survey a broad range of diseases in which the immune system is essential. Topics will include not only diseases that mobilize classical immunity but also conditions to which we now know the immune systems contributes. Students will use oral and written exercises to learn how to evaluate and synthesize major concepts and tools germane to immunology’s relationship to bioscience.

**Course Notes:** Offered jointly with the Medical School as IM 712.0.

**Prerequisite:** Immunology 201 or its equivalent.

**Spring 2016**
**First Meeting:** Tuesday, January 26, 2016
**Final Meeting:** Thursday, May 5, 2016
**Location:** Modell Center 100A Rosen Lecture Hall
**Course Co-Headers:** Filip Swirski, fswirski@mgh.harvard.edu, and Mikael Pittet, mpittet@mgh.harvard.edu
**Teaching Assistants:** Zimeng Zhang, zimengzhang@g.harvard.edu, and Nelson Lamarche, nlamarche@g.harvard.edu
Immunology 204 Critical Readings for Immunology
Duane Wesemann

4 Units

Th 10:00-1:00

Original research articles from fields including immunology, biochemistry, genetics, and cell and developmental biology will be critically analyzed in an intensive small group format. Grading will be based on class participation and oral presentations.

Course Notes: Required for first-year immunology students, open to second-year immunology students. No auditors. Offered jointly with the Medical School as IM 703.0.

Spring 2016
First Meeting: Thursday, January 28, 2016
Final Meeting: Thursday, May 6, 2016
Location: Jeffrey Modell Immunology Center, Rooms # 258, 100A, and Modell Center Atrium
Course Head: Duane Wesemann, dwesemann@research.bwh.harvard.edu
Immunology 301 Immunology Seminar
Michael Carroll and William Haining

4 Units Enrollment: Limited to 20, consent of instructor required.

Wed 12:15-1:15 and 3:30-5:00

Gives students exposure to research topics in Immunology. Students prepare for the weekly seminar through readings, discussions, and preparing brief write-ups. These discussions are facilitated by members of the Committee on Immunology.

Course Notes: Given alternate years with Cell Biology 212. Offered jointly with the Medical School as CB 704.0. Required for, and limited to, first-year Immunology graduate students. All others will be evaluated for enrollment on a case by case basis.

Prerequisite: General knowledge of biochemistry, molecular genetics, and cell biology.

Spring 2016
First Meeting: Wednesday, January 27, 2016
Final Meeting: Wednesday, May 4, 2016
Location: Modell Center, Room 100A
Course Head: Michael Carroll, Michael.Carroll@childrens.harvard.edu
Course Instructor: William Haining, Nicholas_Haining@dfci.harvard.edu
Microbiology

Microbiology 201 Molecular Biology of the Bacterial Cell
David Rudner, Thomas Bernhardt, Simon Dove, and Ann Hochschild

4 Units

Tue and Th 10:00-12:00

This course is devoted to bacterial structure, physiology, genetics, and regulatory mechanisms. The class consists of lectures and group discussions emphasizing methods, results, and interpretations of classic and contemporary literature.

Spring 2016
First Meeting: Tuesday, January 26, 2016
Final Meeting: Thursday, May 5, 2016
Location: NRB 1031
Course Head: David Rudner, rudner@hms.harvard.edu
Course Instructors: Thomas Bernhardt, thomas_bernhardt@hms.harvard.edu, Simon Dove, simon.dove@childrens.harvard.edu, and Ann Hochschild, ahochschild@hms.harvard.edu
Curriculum Fellow: Bradley Coleman, bradley_coleman@hms.harvard.edu
Microbiology 210 Microbial Sciences: Chemistry, Ecology, and Evolution *(Updated)*
Michael Gilmore

4 Units Enrollment: Limited to 20

**Fri 8:30-11:45 (Lecture 8:30-9:30; Discussion 9:45 – 11:45)**

This is an interdisciplinary graduate-level and advanced undergraduate-level course in which students explore topics in molecular microbiology, microbial diversity, and microbially-mediated geochemistry in depth. This course will be taught by faculty from the Microbial Sciences Initiative. Topics include the origins of life, biogeochemical cycles, microbial diversity, and ecology.

**Course Notes:** Also offered as Organismic and Evolutionary Biology 290.

**Prerequisite:** For advanced undergraduates, Life Sciences 1a and 1b are required, or permission of instructor. MCB 52 is recommended.

**Spring 2016**
**First Meeting:** Friday, January 29, 2016
**Final Meeting:** Friday, April 22, 2016
**Location:** Geological Museum 418
**Course Head:** Michael Gilmore
**Course Instructors:** Michael Gilmore
**Teaching Fellow:** Elizabeth Fiore, Elizabeth_Fiore@MEEI.HARVARD.EDU
Microbiology 213 Social Issues in Biology  
Jonathan Beckwith and Louis Guenin

4 Units Enrollment: Limited to 15, consent of instructor required.

Th 1:00-4:00

Discussion course on topics selected from the following: history, philosophy of science; evolution vs. creationism; genetics and race; women and science; genetic testing; genetic enhancement; science journalism; genetics and criminality; science in wartime; scientists and social responsibility; theater and the public presentation of science.

Course Notes: Offered jointly with the Medical School as MG 722.0. Alternates yearly between the Longwood and the Cambridge Campuses.

Prerequisite: Some background in genetics.

Spring 2016
First Meeting: Thursday, January 28, 2016
Final Meeting: Thursday, April 21, 2016
Location: NRB 935
Course Head: Jonathan Beckwith, jbeckwith@hms.harvard.edu
Course Instructors: Louis Guenin and Graduate Students

Further Course Details and Tentative Schedule:
For each session, readings and questions on them should be obtained by going to the My.Harvard.edu website for the course. There will be readings for the first session Jan. 28. The four bolded books seen in the class list below are required and are available at the Harvard Coop under course #MED SCI MB213 or HMS MG 722. Course limit: 15 students- Please contact Jon Beckwith before starting date. jbeckwith@hms.harvard.edu.


February 4  Communicating science: rhetoric and myth construction in biology including “The Lac Operon” as example

February 11 Objectivity in science: preconceptions and bias in studies on race and biology.

Stephen Jay Gould “The Mismeasure of Man” and responses
**February 18** Genetics, human behavior and complex traits: from twin studies to genome wide Association Studies (GWAS) and “missing heritability.”

**February 25** Communicating science: How scientific ideas move from the lab to influencing social norms: science communication. Two readings science and race: evolution of the brain, and genetic structure of human populations- their social consequences.

**March 3** Genes, crime and anti-social behavior: handle-shaped ears, XYY and MAOA

   scientific, social, philosophical and legal issues through three centuries.

**March 10** The 1970’s recombinant DNA controversy and the 2015; The Crispr Debates- Déjà vu all over again?

**March 24** Eugenics and Modern Biology: Is there any connection?

**March 31** Conflicts between science and other disciplines: C.P. Snow’s “The Two Cultures” (1959); and “The Science Wars” (1990s)

**April 7** Gender in science; Science on gender

**April 14** U.S. Scientists and the Third World

**Neurobiology**

**Neurobiology 204 Systems Neuroscience**  
Rachel Wilson, Richard Born, Mark Andermann, Michael Do, Christopher Harvey, and Margaret Livingstone

4 Units Enrollment: Limited to 25, consent of instructor required.

**Mon and Wed 10:00-12:00**

This course introduces major themes and fundamental concepts underlying current research in systems neuroscience. Each week covers a different theme, and draws on research from different sensorimotor modalities and model organisms.

**Course Notes:** Offered jointly with the Medical School as NB 721.0.

**Prerequisite:** Neuro 200 / HST 130 or permission of instructor.

**Spring 2016**

**First Meeting:** Wednesday, January 27, 2016  
**Final Meeting:** Monday, April 25, 2016  
**Location:** Goldenson building, Room 229  
**Course Head:** Rachel Wilson, rachel_wilson@hms.harvard.edu  
**Course Instructors:** Richard Born, richard_born@hms.harvard.edu, Mark Andermann, mark_andermann@hms.harvard.edu, Michael Do, michaeltri.do@childrens.harvard.edu, Christopher Harvey, Christopher_Harvey@hms.harvard.edu, and Margaret Livingstone, margaret_livingstone@hms.harvard.edu
Neurobiology 209 The Neurobiology of Disease
Edward Kravitz and Patricia Musolino

4 Units Enrollment: Limited to 25, consent of instructor required.

Mon 6:00-8:30 p.m. and Wed 7:00-9:30 p.m.

Monday sessions involve patient presentations and “core” lectures describing clinical progression, pathology, and basic science underlying a major disease or disorder. Wednesdays, students present material from original literature sources, and there is general discussion.

Course Notes: Given in alternate years. Offered jointly with the Medical School as NB 713.0. For advanced undergraduate, graduate students, MD and MD/PhD students.

Prerequisite: Introductory neurobiology, biochemistry, and genetics/molecular biology recommended.

Spring 2016
First Meeting: Monday, January 25, 2016
Final Meeting: Wednesday, April 27, 2016
Location: Goldenson Building Room 122
Course Heads: Edward Kravitz, edward_kravitz@hms.harvard.edu, and Patricia Musolino, pmusolino@partners.org
Curriculum Fellow: Brendan Lehnert, blehnr@gmail.com
Neurobiology 211 Molecular and Developmental Neurobiology
Lisa Goodrich, Sandeep Datta, Michela Fagiolini, Chenghua Gu, Pascal Kaeser, Joshua Kaplan, Maria Lehtinen, and Beth Stevens

4 Units Enrollment: Limited to 25, consent of instructor required.

Tue, Th, and Fri 9:00-11:00

Integrated introduction to the molecular events that govern development and function of neural circuits. Topics include neurogenesis, circuit assembly, synaptic transmission, and the associated signaling pathways. Lectures, discussion of primary literature, and original research proposal.

Course Notes: This is an advanced course that assumes prior knowledge of the nervous system. Only students who have completed Neuro200 or its equivalent will be allowed to enroll, as determined by the Course Director.

Spring 2016
First Meeting: Tuesday, January 26, 2016
Final Meeting: Friday, April 22, 2016
Location: Goldenson Building Room 422
Course Head: Lisa Goodrich, lisa_goodrich@hms.harvard.edu
Course Instructors: Sandeep Datta, srdatta@hms.harvard.edu, Michela Fagiolini, michela.fagiolini@childrens.harvard.edu, Chenghua Gu, chenghua_gu@hms.harvard.edu, Pascal Kaeser, kaeser@hms.harvard.edu, Joshua Kaplan, kaplan@molbio.mgh.harvard.edu, Maria Lehtinen, maria.lehtinen@childrens.harvard.edu, and Beth Stevens, Beth.Stevens@childrens.harvard.edu
SHBT 202 Clinical Aspects of Speech and Hearing
Konstantina Stankovic

4 Units

Mon and Wed 5:00-7:00 Clinical Observations: Mon-Fri 8:00-3:00

Clinical approach to speech and hearing disorders as practiced by physicians, audiologists, speech clinicians, rehabilitation specialists, bioengineers. Includes observation of patient care in clinic and operating room, audiology/balance disorders experience, lectures and discussion groups.

Course Notes: Offered jointly with HST 724 at MIT. Classes to be held at the Massachusetts Eye and Ear Infirmary (MEEI).

Prerequisite: Anatomy of Speech and Hearing, Acoustics of Speech and Hearing or permission of the course director.

Spring 2016
First Meeting: Tuesday, January 26, 2016
Final Meeting: Wednesday, April 27, 2016
Location: MEEI, 243 Charles Street, Boston 02114
Course Head: Konstantina Stankovic, konstantina.stankovic@mgh.harvard.edu
Teaching Assistant: Katherine Shera, katherine_shera@hms.harvard.edu
SHBT 203 Anatomy of Speech and Hearing [January Session Course]

Barbara Fullerton, James Heaton, and James Kobler

4 Units Enrollment: Limited to 12, consent of instructor required.

Lecture: Mon-Fri 9:30-10:45 Lab: 10:45-1:30 (Labwork to be held in Gross Labs)

This course covers anatomy of the head and neck, with cadaver dissection, stressing structures important in speech and hearing. Lecture topics also include basic neuroanatomy, imaging, surgery, and cancer of head and neck.

Note: This is an intensive January course. Offered jointly with MIT as HST 718. Classes to be held at the Harvard Medical School campus (HMS).

Prerequisite: Introductory biology or equivalent and permission of the course director, if not an SHBT student.

January Session 2016
Meeting Dates: January 4, 2016 to January 27, 2016
First Meeting: Monday, January 4, 2016
Final Meeting: Friday, January 22, 2016 [Please note that the final meeting date has changed from January 29 to January 22, 2016, with the final exam now scheduled to take place on January 27.]
Final Exam: Wednesday, January 27, 2016
Location: Varies. Listed below.
Course Instructor: Barbara Fullerton, BFULLERTON@PARTNERS.ORG, James Heaton, jheaton@partners.org, and James Kobler, jkobler@partners.org
<table>
<thead>
<tr>
<th>SHBT 203 Class Date</th>
<th>Locations</th>
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<tbody>
<tr>
<td>Monday, January 04, 2016</td>
<td>TMEC 447 Conference room</td>
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<td>Tuesday, January 05, 2016</td>
<td>TMEC 447 Conference room</td>
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<td>Wednesday, January 06, 2016</td>
<td>TMEC 447 Conference room</td>
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<tr>
<td>Thursday, January 07, 2016</td>
<td>TMEC 447 Conference room</td>
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<td>Friday, January 08, 2016</td>
<td>TMEC 250 Mini amphitheater</td>
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<tr>
<td>Monday, January 11, 2016</td>
<td>TMEC 328 Learning studio (Cannon)</td>
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<tr>
<td>Tuesday, January 12, 2016</td>
<td>TMEC 209 Mini amphitheater</td>
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<td>Wednesday, January 13, 2016</td>
<td>TMEC 447 Conference room</td>
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<td>Thursday, January 14, 2016</td>
<td>TMEC 445 Conference room</td>
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<td>Friday, January 15, 2016</td>
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<tr>
<td>Monday, January 18, 2016</td>
<td>------------------No Class – MLK Day ------------------</td>
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<tr>
<td>Tuesday, January 19, 2016</td>
<td>TMEC 445 Conference room</td>
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<td>Wednesday, January 20, 2016</td>
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<td>Thursday, January 21, 2016</td>
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<tr>
<td>Friday, January 22, 2016</td>
<td>TMEC 227 Mini amphitheater</td>
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<tr>
<td>Wednesday, January 27, 2016 (1-4pm)</td>
<td>TMEC 448 Conference room</td>
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<tr>
<td>Thursday, January 28, 2016 (1-4pm) Final Exam</td>
<td>TMEC 447 Conference room</td>
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SHBT 204 Speech Communication
Satrajit Ghosh

4 Units

Tue and Th 11:00-12:30

Survey of human speech communication. Acoustic theory of speech production; physiologic and acoustic descriptions of phonetic features, prosody, voice and speech perception and speech motor control. Applications to recognition, synthesis and speech disorders.

Course Notes: Offered jointly with MIT course HST.710. Classes to be held at MIT.

Prerequisite: Background equivalent to MIT HST.714. SHBT 200 or equivalent.

Spring 2016
First Meeting: Tuesday, February 2, 2016
Final Meeting: Thursday, May 12, 2016
Location: 36-156, MIT, 34 Vassar St, Cambridge, MA 02139
Course Head: Satrajit Ghosh, satrajit.ghosh@gmail.com
SHBT 205 Neural Coding and Perception of Sound *(Updated)*
Bertrand Delgutte, M. Christian Brown, John Guinan, Daniel Polley, and Josh McDermott

4 Units Enrollment: Limited to 20, consent of instructor required.

**Mon and Wed 9:30-11:30**

Neural structures and mechanisms mediating the detection, localization and recognition of sounds. General principles are conveyed by theme discussions of auditory masking, sound localization, musical pitch, cochlear implants, cortical plasticity and auditory scene analysis.

**Course Notes:** Offered jointly with MIT HST.723J.

**Prerequisite:** Neurobiology 200 or permission of instructor

**Spring 2016**
First Meeting: Monday, January 25, 2016
Final Meeting: Wednesday, April 27, 2016
Tentative Final Exam Information: Monday, May 2, 2016
Location: Massachusetts Eye & Ear, 4th floor Conference Room
Course Head: Bertrand Delgutte, [Bertrand_Delgutte@MEELHARVARD.EDU](mailto:Bertrand_Delgutte@MEELHARVARD.EDU)
Course Instructors: M. Christian Brown, [mcb@epl.meei.harvard.edu](mailto:mcb@epl.meei.harvard.edu), John Guinan, [jjg@epl.meei.harvard.edu](mailto:jjg@epl.meei.harvard.edu), Daniel Polley, [daniel_polley@meei.harvard.edu](mailto:daniel_polley@meei.harvard.edu), and Josh McDermott, [jhm@mit.edu](mailto:jhm@mit.edu)
Virology

Virology 201 Virology
Sean P.J. Whelan and James Cunningham

4 Units

Mon and Wed 2:30-4:00

The course focuses on the following areas of virology: (i) epigenetic regulation, (ii) RNA virus replication mechanisms, (iii) innate responses to viral infection, (iv) inhibition of viral infection. The course will comprise lectures as well as reviewing literature that describes fundamental breakthroughs relevant to these areas. Within those areas, the class will read and discuss papers dealing with virus structure, replication, pathogenesis, evolution, emerging viruses, chronic infection, innate and adaptive immunity, anti-viral drugs/vaccines. Special emphasis will be placed on preparing students to critically evaluate the literature, formulate hypotheses and design experiments.

Course Notes: Course format will be lectures, literature-based critical reading and discussion. Prepare and defend a written research proposal. Offered jointly with the Medical School as MG 723.0.

Prerequisite: Graduate standing and permission required.

Spring 2016
First Meeting: Monday, January 25, 2016
Final Meeting: Wednesday, May 11, 2016
Location: TMEC-333 (except Jan 25, 2016, in TMEC-306)
Course Head: Sean P.J. Whelan, sean_whelan@hms.harvard.edu
Course Instructor: James Cunningham, jcunningham@rics.bwh.harvard.edu

Virology 201 Schedule:

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<tr>
<th>SESSION 1</th>
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<tr>
<td>01/25: Instructor:</td>
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<td>01/27: Instructor:</td>
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<td>02/01: Instructor:</td>
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<td>02/03: Instructor:</td>
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<td>02/08: Instructor:</td>
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<tr>
<td>02/10: Lecture Jim Cunningham: What makes a good proposal?</td>
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<td>02/15: PRESIDENTS DAY – NO CLASS</td>
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SESSION 2
02/17: Instructor:  
02/22: Instructor:  
02/24: Instructor:  
02/29: Instructor:  
03/02: Instructor:  
**SESSION 3**  
03/07: Instructor:  
03/09: Instructor:  
**SPRING RECESS: 3/12 - 3/20**  
03/21: Proposals Due Today  
03/23: Instructor:  
03/38: Instructor:  
**SESSION 4**  
03/30: Instructor:  
04/04: Instructor:  
04/06: Instructor:  
04/11: Written Proposal Feedback by 4/13  
04/13: Instructor:  
**SESSION 5**  
04/18: Instructor:  
04/20: Instructor:  
04/25: Instructor:  
05/27: Instructor:  
05/04: Instructor:  
05/11: Proposal Presentation