

# **Syllabus**

**HST 030  
Human Pathology**

**Fall 2018**

**Course co-Directors:**

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## Syllabus HST 030 Human Pathology, 2018

<b><u>Contents</u></b>	<b><u>pages</u></b>
Contents	2
Schedule	3-5
Course Objectives	6
Course Description	6-8
Reading Assignments	8
Autopsy Participation and Report	8-10
Directions to the Autopsy Suite	10
Lectures, Laboratories, and Conferences	10-11
Faculty	12-13
Textbooks and other teaching materials	14
Course Website	15
Internet/World Wide Web Resources	15

**Lecture Notes**

**Frontiers Objectives**

**Laboratory Notes**

**Clinical Case Conference Notes and Problem Sets**

**Exams, 2017**

**COURSE SCHEDULE/HST 030 Human Pathology 2018****Tuesday 9/4 (Ramadan from May 15-June 14)**

8:30-9:00	<b>Course Introduction</b>	Dr. Mitchell
9:00-10:15	<b>Introduction to Pathology: Patient to Pathogenesis</b>	Dr. Schoen
10:15-11:30	<i>Lab I: Gross Pathology-Autopsy</i>	
11:30-12:30	<b>Frontiers: Models of Human Disease:</b> <u>Are You a Man or a Mouse...or a CRISPR'd Man-Mouse?</u>	Dr. Lovitch

Lunch with Dr. Lovitch and interested students

**Thursday 9/6 (POW: Interpreting Laboratories)**

8:30-9:30	<b>Laboratory Medicine:</b> <b>Blood, Sweat, and Tears (And What to Do with Them)</b>	Dr. McAdam
9:30-11:30	<b>The Autopsy: Why, How, and Whodunnit</b>	Drs. Padera, Flomenbaum, and Mitchell
<b>11:45-12:45</b>	<b>Pizza &amp; Pizazz: HST Frontiers Seminar Series</b> <b>"Mining the Microbiome: It's Not Just Old Stool"</b>	<b>Dr. Bry</b>
1:00-3:00	<b>Boot Camp (optional): Anatomy and Physiology</b>	Dr. Padera
<b>Saturday 9/8</b>		
9:30-1:30	<b>Boot Camp (optional): Cell Biology, and Biological Techniques</b>	Drs. Howard and Mitchell

**Tuesday 9/11 (Rosh Hashanah September 9-11)**

8:30-9:30	<b>Subcellular Organization: Housekeeping and Pathologic Messes</b>	Dr. Mitchell
9:30-11:30	<i>Lab II: Histology I: Cells to Epithelium, simply (cervix, jejunum, liver, pancreas and adrenal)</i>	
11:30-12:30	<b>Frontiers: Mitochondrial Disorders: Energy Crises in the Making</b>	Dr. Mootha

Lunch with Dr. Mootha and interested students

**Thursday 9/13 (POW: Techniques and Models You'll Probably Need to Understand)**

8:30-10:00	<b>Epithelium: Life on the Edge or The Importance of Knowing What's Up (plus: A Chalk Talk—Building a Pancreas)</b>	Dr. Padera
10:00-11:30	<i>Lab III: Histology II: Epithelium, further stratified</i>	
<b>11:45-12:45</b>	<b>Pizza &amp; Pizazz: HST Frontiers Seminar Series</b> <b>"Topology Matters: Epithelial Morphogenesis in 3-Dimensions"</b>	<b>Dr. Brugge</b>

**Tuesday 9/18 (Yom Kippur September 18-19)**

8:30-9:45	<b>Extracellular Matrix: Not Just the Stuff Around Cells</b>	Dr. Padera
9:45-11:00	<i>Lab IV: Histology III: Connective Tissue, Cells and Matrix</i>	
11:00-12:30	Case Study I: "35-year old male with chest pain"	

**Thursday 9/20 (POW: Predicting Pathology from the Biology)**

8:30-9:45	<b>Cardiovascular System: The Heart of the Matter</b>	Dr. Padera
9:45-11:30	<i>Lab V: Histology IV: Cardiovascular System and Muscle</i>	
<b>11:45-12:45</b>	<b>Pizza &amp; Pizazz: HST Frontiers Seminar Series</b> <b>"Tensegrity: Mechanical Engineering in Cells and Tissues"</b>	<b>Dr. Ingber</b>
(On-line quiz available!!)		
<b>Saturday 9/22</b>	<i>Laboratory Practicum-Hematology and Chemistry</i>	BWH Clinical Pathology Fellows
9 am-noon and 10 am-1 pm	45 Francis Phlebotomy Center	

**Tuesday 9/25**

8:30-9:45	<b>Excitable Tissues: Muscle and Nerve</b>	Dr. Frosch
9:45-11:30	<i>Lab VI: Histology V: CNS/PNS</i>	
11:30-12:30	<b>Frontiers: Alzheimer's Disease: The Path to Therapeutics</b>	Dr. Selkoe

Lunch with Dr. Selkoe and interested students

**Thursday 9/27 (POW: An Affair of the Heart)**

8:30-9:30	<b>Blood and Bone Marrow: Stem Cells and Hematopoiesis</b>	Dr. Morgan
9:30-11:30	<i>Lab VII: Histology VI: Hematopoietic and Immune Tissues</i>	
<b>11:45-12:45</b>	<b>Pizza &amp; Pizazz: HST Frontiers Seminar Series</b> <b>"Biomarker Discovery: From Technology Development to Clinical Applications"</b>	<b>Dr. Walt</b>

**Tuesday 10/2**

8:30-9:45	<b>Gynecologic Histology: Physiologic Hyperplasia and Regression</b>	Dr. Mitchell
9:45-11:30	<i>Lab VIII: Histology VII: Tissues Responding to Cyclic Hormones</i>	
11:30-12:30	<b>Frontiers: "Stem Cells: Myth, Promise, and Possibility"</b>	Dr. Daley

Lunch with Dr. Daley and interested students

6:00-10:00	<i>Optional: Learning Opportunity I Review (and burritos)</i>	Drs. Howard and Padera
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**Thursday 10/4**

8:30-10:30	<b>LEARNING OPPORTUNITY I</b>	
10:30-11:30	<i>Lab IX: Gross Pathology: Injury, Infection, and Depositions</i>	
<b>11:45-12:45</b>	<b>Pizza &amp; Pizazz: HST Frontiers Seminar Series</b> <b>"Coughs and Sneezes: Spreading the Wealth"</b>	<b>Dr. Bourouiba</b>

<b>Tuesday 10/9 (Indigenous Peoples' Day 10/8)</b>		
8:30-9:45	<b>Cell Injury and Death: Live and Let Die-A Chalk Talk</b>	Dr. Mitchell
9:45-11:15	<i>Lab X: Cell Injury</i>	
11:15-12:30	<u>Frontiers: Molecular and Cell Biology of Aging:</u> <u>The Final Frontier of Medicine</u>	Dr. Sinclair
<i>Lunch with Dr. Sinclair and interested students</i>		
<b>Thursday 10/11 (POW: Wanted: Dead or Alive)</b>		
8:30-9:30	<b>Apoptosis and Autophagy: So Many Ways to Die</b>	Dr. Henske
9:30-11:30	Case Study II: "40-year old female found unconscious at home"	
<b>11:45-12:45</b>	<b>Pizza &amp; Pizazz: HST Frontiers Seminar Series</b> <b>"Therapeutic Targeting of the Mitochondrial Pathways of Apoptosis"</b>	<b>Dr. Walensky</b>
12:45-1:30	<i>Optional: Mid-course Feedback and Post-mortem on Learning Opportunity I</i>	Drs. Mitchell and Padera
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<b>Tuesday 10/16</b>		
8:30-9:45	<b>Acute Inflammation: The Tissue Dogs of War</b>	Dr. Mitchell
9:45-11:30	<i>Lab XI: Necrosis and Acute Inflammation</i>	
11:30-12:30	<u>Frontiers: Border Crossings—Building a Different Kind of Wall</u>	Dr. Turner
<i>Lunch with Dr. Turner and interested students</i>		
<b>Thursday 10/18 (POW: Not Exactly What We Expected)</b>		
8:30-10:00	<b>Chronic Inflammation and Repair: Filling in the Gaps</b> <b>Another Semi-Chalk Talk</b>	Dr. Mitchell
10:00-11:30	<i>Lab XII: Chronic Inflammation, Repair, and Degeneration</i>	
<b>11:45-12:45</b>	<b>Pizza &amp; Pizazz: HST Frontiers Seminar Series</b> <b>"Knitting the Raveled Sleeve (or Labrum) of Care"</b>	<b>Dr. Price</b>
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<b>Tuesday 10/23</b>		
8:30-9:45	<b>Hemostasis and Thrombosis: Go With the Flow</b>	Dr. Mitchell
9:45-11:30	<i>Lab XIII: Circulatory Disorders-Thrombosis and Atherosclerosis</i>	
11:30-12:30	<u>Frontiers: At the Vascular Interface: Endothelial Cell (Dys)Function</u>	Dr. Garcia-Cardeña
<i>Lunch with Dr. Garcia-Cardeña and interested students</i>		
<b>Thursday 10/25 (POW: Plaintiff or Defense: The Curious Case of the Broken Heart)</b>		
8:30-9:45	<b>Atherosclerosis: The Plaque Thickens...and Breaks</b>	Dr. Schoen
9:45-11:30	<i>Lab XIV: A Stroke after Knee Surgery—Wait...What? Crowd Sourcing a Diagnosis"</i>	
<b>11:45-12:45</b>	<b>Pizza &amp; Pizazz: HST Frontiers Seminar Series</b> <b>"Better Visualization of Impending Doom"</b>	<b>Dr. Jaffer</b>
<b>Special Pathology Hallowe'en TGIF 10/26 5 pm until ????</b>		
<b>Saturday 10/27</b>		
10:30-12:30	<b>Boot Camp (optional): Immunology</b>	Dr. Mitchell
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<b>Tuesday 10/30</b>		
8:30-10:00	<b>Donuts for Diabetes: All the RAGE in Vascular Pathology</b>	Dr. Padera
10:00-11:30	Case Study III: "30-year old male with syncope"	
11:30-12:30	<u>Frontiers: Quartiles and Queries:</u> <u>How Epidemiology Can Inform Pathobiology</u>	Dr. Ridker
<i>Lunch with Dr. Ridker and interested students</i>		
<b>Thursday 11/1 (POW: Rorschach Clot)</b>		
8:30-9:45	<b>Immune-Mediated Injury: Too Much of a Good Thing?</b>	Dr. Mitchell
9:45-10:30	<i>Lab XV: Immunopathology</i>	
10:30-11:30	Case Study IV: "24-year old female with fatigue, joint pain, and a rash"	
<b>11:45-12:45</b>	<b>Pizza &amp; Pizazz: HST Frontiers Seminar Series</b> <b>"Microimaging: Seeing the Unseen in Living Patients"</b>	<b>Dr. Tearney</b>
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<b>Tuesday 11/6</b>		
8:30-10:00	<b>Response to Infection:</b> <b>When the Human Body and Microorganisms Collide</b>	Dr. Mitchell
10:00-11:30	<i>Lab XVI: Infectious Diseases</i>	
11:30-12:30	Case Study V: "75-year old man with fever and a cough"	
<b>Thursday 11/8 (Veteran's Day 11/11) (POW: Microbes Run Amok)</b>		
8:30-10:30	<b>The Pathobiology of HIV and AIDS</b>	Dr. Milner
10:30-11:30	<i>Lab XVII: Pathology of the Immunocompromised Host</i>	
<b>11:45-12:45</b>	<b>Pizza &amp; Pizazz: HST Frontiers Seminar Series</b> <b>"Pathology in the Developing World"</b>	<b>Dr. Milner</b>

<b>Tuesday 11/13</b> 8:30-9:30 9:30-11:30  11:30-12:30	<b>Biomaterials, Medical Devices, and Tissue Engineering</b> <i>Lab XVIII: Complications of Medical Devices</i>  <u>Frontiers: "There Goes the Neighborhood: Role of Tumor Microenvironment in Progression and Treatment"</u>	Dr. Padera Drs. Rodriguez, Padera, and Mitchell Dr. Jain
Lunch with Dr. Jain and interested students 6:00-10:00	<i>Optional: Learning Opportunity II Review (and more burritos)</i>	Drs. Howard and Padera
<i>Examine cadavers in HST 010 11/16 3:00-6 pm</i>		
<b>Thursday 11/15</b> 8:30-10:30 10:30-11:30 <b>11:45-12:45</b>	<b>LEARNING OPPORTUNITY II</b> <i>Lab XIX: Gross Pathology: Neoplasia</i> <b>Pizza &amp; Pizazz: HST Frontiers Seminar Series</b> <b>"The Strange Family Across the Street... and Other Coming-of-Age Stories"</b>	<b>Dr. Colson</b>
<b>Tuesday 11/20 (POW: <i>Is Cancer the Answer?</i>)</b> 8:30-10:00 10:00-11:30 11:30-12:30 1:00-2:00	<b>Neoplasia: How Good Cells Go Bad</b> <i>Lab XX: Neoplasia I-Epithelial Malignancies</i> Case Study VI: "28-year old woman presenting for routine gynecologic care" <i>Optional: Post-mortem on Learning Opportunity II</i>	Dr. Padera  Drs. Mitchell and Padera
<b>Thursday 11/22</b>	<b>THANKSGIVING HOLIDAY</b>	
<b>Tuesday 11/27</b> 8:30-9:30 9:30-11:30 11:30-12:30	<b>Environmental Oncogenesis</b> Case Study VII: "35-year old woman with a worrisome mole" <u>Frontiers: Molecular Diagnostics: From the Lazarus Effect to the Liquid Biopsy—Implications for Surgical Pathology and Oncology</u>	Dr. Granter  Dr. Sholl
Lunch with Dr. Sholl and interested students		
<b>Thursday 11/29 (POW: <i>Resistance is not Futile; It's Current Divided by Voltage...and It's Why Tumors Recur</i>)</b> 8:30-10:00 10:00-11:30 <b>11:45-12:45</b>	<b>Neoplasia: Tumor-Host Interactions</b> <i>Lab XXI: Neoplasia II-Non-Epithelial Malignancies (and unknown glass slides for Case VIII)</i> <b>Pizza &amp; Pizazz: HST Frontiers Seminar Series</b> <b>"CTCs: Finding a Needle in a Haystack"</b>	Dr. Padera  <b>Dr. Toner</b>
<b>Tuesday 12/4 Autopsy Report formally due on December 7!! (Hanukkah 12/2-12/10)</b> 8:30-9:45  9:45-11:30 11:30-12:30	<b>Surgical Pathology of Tumors</b> <b>The Good, the Bad, the Ugly</b> Case Study VIII: "65-year old male smoker with a 'coin lesion' on chest X-ray" <u>Frontiers: The Great Escape: Draining Fluid and Cells Out of Tissues</u>	Dr. Padera  The Other Dr. Padera
Lunch with Drs. Padera and interested students		
<b>Thursday 12/6 (POW: <i>The Link Between Pathobiology and Risk</i>)</b> 8:30-9:30 9:30-11:30 <b>11:45-12:45</b>	<b>Hematopoietic Neoplasms: The Dark Side of Leukocytes</b> Case Study IX: "70-year old woman with facial flushing and diarrhea" <b>Pizza &amp; Pizazz: HST Frontiers Seminar Series</b> <b>"Exploring the Sources of Cancer"</b>	Dr. Morgan  <b>Dr. Ebert</b>
<b>Tuesday 12/11</b> 8:30-10:00 10:00-11:30 11:30-12:30	<b>Neoplasia: Morbidity and Mortality</b> <i>Lab XXII: Neoplasia III-The Contribution of Pathology to Patient Care</i> <u>Frontiers: Molecular Underpinnings in Leukemia</u>	Dr. Padera  Dr. Tothova
Lunch with Dr. Tothova and interested students		
<b>Thursday 12/13</b> 9:30-10:30  10:30-12:30 <b>12:45-1:45</b>	<b>Brunch and Brouhaha: There's No Free Lunch in Cancer Therapy: Magic Bullets and Collateral Damage</b> <i>Pathology Diagnostic Derby</i> <b>Pizza &amp; Pizazz: HST Frontiers Seminar Series</b> <b>"Cancer Therapeutics"</b>	<b>Dr. Nohria</b>  Dr. Hornstein and Faculty <b>Dr. Bradner</b>
<b>Saturday 12/15</b> 10:30-2:30	<i>Optional: Final Learning Opportunity Review</i>	Drs. Howard and Padera
<b>Wednesday 12/19 (Christmas 12/25)</b> 9:30-12:30 12:30-	<b>FINAL LEARNING OPPORTUNITY</b> Decompression, glycogen repletion, and hepatic exercise	

**Autopsy Reports due no later than Friday, December 21!!**

**Locations:** All lectures, laboratories, and conferences take place in the HST Skills Area [MEC 202, 203, 206, 207, 209, and 212]

**Objectives:**

• **To present normal structure and function of molecular elements (nucleic acids and proteins), subcellular organelles, cells, extracellular matrix, tissues, and organs.**

Students should be able to:

- identify normal cell and tissue components, and the histology of normal organs
- infer functionality based on cell or tissue structure
- identify normal morphologic variation and the effects on structure and function of normal physiologic stimuli (e.g., hormones, exercise, nutrition, etc.)

• **To present the morphology and mechanisms of general classes of disease, with specific illustrative examples; extrapolating from the level of molecular, subcellular, or cellular dysfunction to the pathology of tissues, organs, and the whole body.** Students should be able to:

- articulate basic disease mechanisms including cell injury, acute and chronic inflammation, scarring, thrombosis, atherosclerosis, infarction, infectious disease, immune-mediated injury, and malignancy
- identify targets for potential therapeutic intervention
- recognize abnormal structures and organs both grossly and histologically
- infer likely pathophysiologic consequences based on the nature of cell or tissue lesions
- suggest possible mechanisms that can underlie an identified pathology

• **To present an introduction to the science and practice of pathology.** Students should be able to:

- describe the role of the pathologist in surgical and medical practice
- describe the utility and logistical details of autopsies
- describe the role of pathologists in biomedical and clinical investigation

• **To set a foundation for subsequent pathophysiology courses.** Students should be able to:

- describe the basic structure-function correlates in all tissues
- describe the basic pathologic mechanisms that underlie human disease

**Content:**

1. Principles of tissue compartmentalization and structural adaptations, and the functional structure of normal cells, tissues, and organs.

2. Principles of general pathology (pathologic basis of human disease), including cell/tissue injury and adaptation, aging, inflammation, circulatory disorders, infection, environmental pathology, genetic disorders, neoplastic diseases, and mechanisms and morphology of immune-mediated injury.

3. Scientific foundations of pathology and methods of pathologic analysis, including principles of tissue preparation and evaluation, role of the autopsy in contemporary medicine, surgical pathologic diagnosis of tumors, laboratory medicine, immunologic and molecular applications in diagnosis, and experimental investigation.

**Organization and Format:**

1. Tuesday, 8:30 am-12:30 pm and Thursdays, 8:30-11:30 am; approximately 3-4 hours of lectures and 4-5 hours of laboratories/conferences each week. The latter include microscopic slides, gross specimens, gross and microscopic image tutorials on-line, and either prepared interactive problem set discussions, conference discussions, case studies, or "frontiers" conferences by leading investigators illustrating relevant contemporary experimental pathology.
2. Required autopsy participation and report (see details further below).
3. Laboratory Medicine Practicum (**Saturday, September 22**); not required but strongly encouraged.
4. "Boot Camps", primarily for non-MD students, to help bring those without strong backgrounds in the biological sciences up-to-speed; these are not required, but are strongly encouraged. Basic Anatomy and Physiology (**Thursday, September 6**), Cell Biology and Biological Techniques (**Saturday, September 8**), and Immunology (**Saturday, October 27**).
5. "Meet the Speakers" lunches following most Frontiers sessions (and some regular lectures), to allow students to interact in a more informal setting with local physician-scientists. These are strictly optional, but do include lunch for six (6) students, first come, first served.
6. The HST **Pizza and Pizazz** Frontiers Seminar sessions are also optional (and are a distinct entity outside of HST 030), intended to expose students to exciting research opportunities within the HMS/HST community. They occur on most Thursdays throughout the semester, typically from 11:45-12:45 (please see the HST 030 schedule). Although not required, these are highly recommended (and come with a pizza lunch!).

**Locations:**

All lectures, laboratories (gross and histology), conferences, and exams take place in the HST Skills Area [**MEC 202,203,206,207,209**], unless otherwise specified (e.g., *Meet the Speakers* lunches occur in TMEC 212)  
 HST 030 on-line resources through MyCourses  
 Autopsy observations at Brigham and Women's Hospital  
 Laboratory Medicine Practicum (**September 22**) in the Clinical Laboratory, Brigham and Women's Hospital, 45 Francis Phlebotomy Center

**Examinations and Grading:**

Three examinations (AKA: "learning opportunities"), consisting of two 2-hour mid-terms and one 3-hour final exam will be given; these are typically composed of short answer/mini-essay type questions, but will also include glass slide, projected image, electron micrograph, and/or gross tissue identification. The final exam emphasizes material from the last third of the semester, but contains material that effectively bridges the entire cumulative content of the course.

**Examinations:**

<b>Learning Opportunity I</b>	<b>October 4</b>
<b>Learning Opportunity II</b>	<b>November 15</b>
<b>Final Learning Opportunity</b>	<b>December 19</b>

The course grade is determined as follows:

<b>Learning Opportunity I</b>	<b>20%</b>
<b>Learning Opportunity II</b>	<b>20%</b>
<b>Final Learning Opportunity</b>	<b>30%</b>
<b>Autopsy Report</b>	<b>20%</b>
<b>Problem Sets (POWs)</b>	<b>5%</b>
<b>Participation (cases, labs, feedback, lectures)</b>	<b>5%</b>

**Grading:** Only pass/fail grades will be sent to the HMS and MIT Registrars. However, students' performances will be evaluated for internal HST purposes as **excellent, satisfactory, marginal, or unsatisfactory**. Graduate students have the option of requesting conventional letter grades.

### ***Reading Assignments:***

Several concepts are of sufficient general import in medicine and the course time insufficient to cover them, so that significant reading beyond the syllabus is necessary.

**Required readings are from Robbins and Cotran Pathologic Basis of Disease, 9<sup>th</sup> Edition, 2015:**

**The Cell as a Unit of Health and Disease** (Chapter 1)

**Cellular Responses to Stress and Toxic Insults:**

**Adaptation, Injury, and Death** (Chapter 2)

**Inflammation and Repair** (Chapter 3)

**Diseases of the Immune System** (Chapter 6)

**Neoplasia** (Chapter 7)

**Blood Vessels** (Chapter 11)

*Of course, a little extra reading each night from other chapters of PBD 9<sup>th</sup> is good for the soul, and occasionally helpful for insomnia.*

In addition, notes concerning the **Historical Perspective of Cancer** (prepared by Dr. George Th. Diamandopoulos), and **Effects of Tumors on the Host** (prepared by Dr. Frederick Schoen) are included at the beginning of the course materials concerning neoplasia. These are of significant general interest and help provide context to the subsequent pathophysiologic discussions.

### ***Autopsy Participation and Report:***

Each student is required to observe an autopsy—including the examination of tissue slides from the autopsied organs—and write an autopsy report. The report will consist of:

- A brief clinical summary and the clinical questions to be answered at autopsy.
- Pertinent diagnostic findings with clinicopathologic correlations (example: heavy, congested lungs with neutrophilic infiltrates and *streptococci* present on cultures and gram stain establishes a diagnosis of pneumonia and correlates with the patient's fever, purulent sputum, elevated white blood cell count, and pre-mortem X-ray findings).
- A brief (paragraph or so) summary of the cause of death.
- A discussion of some aspect of the case or contributory pathologic process that is of personal interest. The discussion should extend beyond the level of current textbook knowledge (*please teach me something!*); it's perfectly acceptable to pick a topic that you already know something about and take advantage of your prior research (or other) interests.

The summary of the diagnostic findings may rely heavily on the efforts of the Resident prosector on the case; moreover, your discussion on the clinicopathologic and pathophysiologic issues may be done cooperatively with other students. *However, each student's enlighten-Rick report should be a unique product of that individual's work.*

Details of the logistics of the autopsy observation will be given in class by the second week of the course; specifics of the report preparation (e.g., topic, etc.) will be facilitated by the course faculty. **The entire report should be no longer than 10 pages; remember: quantity  $\neq$  quality** (and pages of gibberish only irritate the Course Director). The paper is worth 20 percent of your overall grade, and will be evaluated on four (4) criteria (**5 points each**):

- Clinicopathologic correlations
- Teaching value for the Course Director (did he learn something new?)
- Quality of the writing
- Entertainment value (did the Course Director enjoy reading the paper?)

Outstanding examples from last year are included after the lecture notes concerning "The Autopsy: Why, How, and Whodunit" (**September 7**).



**The actual mechanics of the autopsy are as follow:**

- Students are assigned to groups of four individuals who will participate in the autopsy as a team. **Autopsy teams must be completely different than Anatomy dissection groups, to minimize disruption of other course work.**
  - Teams will be given an assigned order to view an autopsy. When an autopsy occurs, one member of the next group in line will be notified by hospital beeper (worn at all times, *and guarded with your life*), and he/she will notify the rest of the group.
  - Students should not leave lectures from other courses (missing a Pathology lecture is acceptable), nor should they miss Anatomy prosections or examinations in any course. In the event of such conflicts, the team leader should at least respond to the page. Whenever there is no conflict, all students in the appropriate group are **strongly** encouraged to attend; this is to insure that all students get to participate in an autopsy as expeditiously as possible.
  - **Although observing an entire autopsy is often a life-changing experience (generally for the better), students need *not* attend the entire case. However, all students in a given autopsy group must be present for the organ review with the Attending Pathologist at the end of the case, and also attend the associated Autopsy Conference. These allow correlation of clinical information with radiologic and pathologic findings, and are excellent learning opportunities. The Autopsy Conferences occur at Brigham and Women's Hospital on Monday and Wednesday mornings at 8 am, and Friday mornings at 9:15 am.**
  - Please be mindful that the Autopsy Resident and Pathology Assistant have a job to do, and may not be able to attend to all your possible inquiries. However, please jot down any questions as you go along, and feel free to *bombard* the Attending Pathologist when s/he goes over the case.
  - All students should also attend a histology slide review for your case; this may be either with the Autopsy Resident on the case or with Drs. Mitchell or Padera. This will generally occur 1-2 weeks after the autopsy takes place.
  - If a student misses an opportunity, s/he will be bumped to the bottom of the list.
  - Students are encouraged to attend more than one autopsy, at their discretion, but should only see additional cases *after* all other students have had their opportunity.
- A map to the autopsy suite is shown on the next page. **HOWEVER, in general it is best to arrange to meet the Resident responsible for the case, and let him/her escort you to the morgue the first time you go**; it can be confusing in the bowels of the Brigham (and your GPS will be useless), and we've all seen too many horror films about getting lost in a hospital.

Your best resources on any given case will be the Pathology Resident who performed the original dissection, as well as the Attending Pathologist. However, your friendly Course Directors (Rick and Bobby) can often field specific questions related to any aspect of the autopsy...

...or you can contact the Autopsy Director at BWH: **Dr. Bobby Padera** (525-6792).

## Lectures, Laboratories, and Conferences

### Boot Camps

#### *Lectures:*

Basic Anatomy and Physiology  
Cell Biology and Biological Techniques  
Immunology

### Cell and Tissue Structure and Function

#### *Lectures:*

Introduction to Pathology: Patient to Pathogenesis  
Subcellular Organization: Housekeeping and Pathologic Messes  
Epithelium: Life on the Edge *or* The Importance of Knowing What's Up  
Extracellular Matrix: Not Just the Stuff Around Cells  
Cardiovascular System: The Heart of the Matter  
Excitable Tissues: Muscle and Nerve  
Blood and Marrow: Normal and Pathologic Hematopoiesis  
Gynecologic Histology: Physiologic Hyperplasia and Regression

#### *Frontiers:*

Animal Models of Human Disease: Are You a Man or a Mouse?  
Stem Cells: Myth, Promise, and Possibility

#### *Laboratories:*

Histology I: Cells to Epithelium, Simply  
Histology II: Epithelium, Further Stratified  
Histology III: Connective Tissue, Cells, and Matrix  
Histology IV: The Cardiovascular System and Muscle  
Histology V: CNS/PNS  
Histology VI: Hematopoietic and Immune Tissues  
Histology VII: Tissues Responding to Cyclic Hormones

### General Pathology

#### *Lectures:*

Cell Injury and Death: Live and Let Die  
Apoptosis and Autophagy: So Many Ways to Die  
Acute Inflammation: The Tissue Dogs of War  
Chronic Inflammation and Repair: Filling in the Gaps  
Hemostasis and Thrombosis: Go With the Flow  
Atherosclerosis: The Plaque Thickens...and Breaks  
Donuts for Diabetes: All the *RAGE* in Vascular Pathology  
Immune-Mediated Injury: Too Much of a Good Thing?  
Response to Infection: When the Human Body and Microorganisms Collide  
The Pathobiology of HIV and AIDS  
Biomaterials, Medical Devices, and Tissue Engineering  
Neoplasia: How Good Cells Go Bad  
Environmental Oncogenesis  
Neoplasia: Tumor-Host Interactions  
Hematopoietic Neoplasms: The Dark Side of Leukocytes  
Neoplasia: Morbidity and Mortality

#### *Frontiers:*

Mitochondrial Disorders: Energy Crises in the Making  
Alzheimer's Disease: The Path to Therapeutics  
Molecular and Cell Biology of Aging: The Final Frontier of Medicine  
Border Crossings—Building a Different Kind of Wall  
At the Vascular Interface: Endothelial Cell (Dys)Function  
Quartiles and Queries: How Epidemiology Can Inform Pathobiology  
There Goes the Neighborhood: Role of Tumor Microenvironment in Progression  
and Treatment  
The Great Escape: Draining Fluid and Cells *Out* of Tissues

Molecular Underpinnings in Leukemia

There's No Free Lunch in Cancer Therapy: Magic Bullets and Collateral Damage

*Laboratories:*

Injury, Infection, and Depositions-Gross Pathology

Cell Injury

Necrosis and Acute Inflammation

Chronic Inflammation, Repair, and Degeneration

Circulatory Disorders-Thrombosis and Atherosclerosis

A Stroke After Knee Surgery—Wait...What? Crowd Sourcing a Diagnosis

Immunopathology

Infectious Diseases

Pathology of the Immunocompromised Host

Complications of Medical Devices

Neoplasia-Gross Pathology

Neoplasia I-Epithelial Malignancies

Neoplasia II-Non-epithelial Malignancies

Neoplasia III-The Contribution of Pathology to Patient Care

Pathology Diagnostic Derby

**Contemporary Practice of Pathology**

*Lectures:*

Laboratory Medicine: Blood, Sweat, and Tears (And What to Do with Them)

The Autopsy: Why, How, and Whodunit

Surgical Pathology of Tumors: The Good, the Bad, and the Ugly

*Frontiers:*

Molecular Diagnostics: From the Lazarus Effect to the Liquid Biopsy—Implications for Surgical Pathology and Oncology

*Laboratories:*

Autopsy-Gross Pathology

Laboratory Medicine Practicum (September 22)

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**Textbooks and Other Teaching Materials (\* = recommended text)**

***Histology Atlas:***

\*WHEATER'S FUNCTIONAL HISTOLOGY, 6<sup>th</sup> Ed: Young, Woodford, and O'Dowd, Elsevier, 2013

***Pathology Texts:***

**ROBBINS and COTRAN PATHOLOGIC BASIS OF DISEASE, 9<sup>th</sup> Ed:** Kumar, Abbas, and Aster, Elsevier/Saunders, 2015 (***Required text***)  
(with password protected access to the [studentconsult.com](http://studentconsult.com) website)

\*BASIC PATHOLOGY, 10<sup>th</sup> Ed: Kumar, Abbas, and Aster, Elsevier, 2018

***Pathology Atlas:***

\*WHEATER'S BASIC PATHOLOGY, 5<sup>th</sup> Ed: Young, O'Dowd, and Stewart, Elsevier, 2009

***Miscellaneous Texts:***

CELLULAR AND MOLECULAR IMMUNOLOGY, 9<sup>th</sup> Ed: Abbas, Lichtman, and Pillai, Elsevier, 2017

MOLECULAR CELL BIOLOGY, 8<sup>th</sup> Ed: Lodish, Berk *et al.*, W.H. Freeman and Co., 2016

THE CELL, A MOLECULAR APPROACH, 7<sup>th</sup> Ed: Cooper and Hausman, Sinauer Associates, Inc., 2015

\*STEDMAN'S or DORLAND'S Medical Dictionary

\*THE MERCK MANUAL (great for clinical cases)

***Videodisk Tutorials/Computer Programs:***

HISTOLOGY TUTORIAL for "Histology: A Photographic Atlas" and GENERAL PATHOLOGY TUTORIAL for "Slice of Life" (both available on-line through the course website)

***Self-Assessment Guides:***

ROBBINS AND COTRAN REVIEW OF PATHOLOGY, 4<sup>th</sup> Ed: Klatt and Kumar, Elsevier/Saunders, 2015

ROBBINS AND COTRAN PATHOLOGY FLASH CARDS, 2<sup>nd</sup> Ed: Klatt and Mitchell, Elsevier/Saunders, 2015

**HST 030 Website:**

Of course, **Human Pathology** is on-line. The site exists exclusively for HST/MEMP students currently enrolled in the course; it is intended to facilitate the following major objectives:

- i) List the course schedule with topics, lecturers, and times
- ii) Provide access to annotated laboratory images, including Videodisk Tutorials (see below), and scanned histopathology images
- iii) Provide answers and pertinent links for problem sets and case conferences
- iv) Provide PowerPoint presentations or other ancillary materials from lectures
- v) Provide the on-line practice quiz (available 9/20)

You can access it from the Canvas portal: <https://canvas.hms.harvard.edu/courses/>  
Specific questions should be sent via e-mail ([rmitchell@partners.org](mailto:rmitchell@partners.org) or [thomas\\_howard@hms.harvard.edu](mailto:thomas_howard@hms.harvard.edu)), or submitted with the daily lecture feed-back forms. We'll get back to you with answers.

**Internet/World Wide Web Resources**

*This information is included primarily for your interest and edification; some of the images, tutorials, and other educational materials are quite good, and are a nice adjunct to this syllabus. Others are not nearly as pretty or intellectually stimulating. No material from the Net will intentionally appear on any examination so that you are not formally responsible for anything out there in the ether. However, you may find that the material is presented in a novel and/or interesting fashion and is helpful for you to understand some point. This list is obviously not all-inclusive; **please let me know if you locate a particularly good site not listed here.***

## GENERAL INDEXES and REFERENCES

Internet Resources for Pathology, University of Michigan

[http://www.pds.med.umich.edu/users/amp/path\\_resources.html](http://www.pds.med.umich.edu/users/amp/path_resources.html)

MedWeb Pathology and Laboratory Medicine, Emory University

<http://www.emory.edu/WHSC/medweb.pathology.html>

PathIT

<http://www.pathit.com/>

## MEDICAL IMAGE DATABASES

The Urbana Atlas of Pathology, Univ. Ill. at Urbana-Champaign

<http://www.med.uiuc.edu/PathAtlas/titlePage.html>

Webpath, University of Utah

<http://www-medlib.med.utah.edu/WebPath/webpath.html>

Pathology Images, Cornell University

<gopher://guru.med.cornell.edu:70/11/Medical%20College/Images>

## CASE STUDIES

Pittsburgh Case Index, University of Pittsburgh

<http://path.upmc.edu:80/cases/>

Pathology Cases from RWJ School of Medicine

[gopher://mirage.umdj.edu:70/11/Pathology\\_Images](gopher://mirage.umdj.edu:70/11/Pathology_Images)

Virtual autopsy cases

[http://www.le.ac.uk/pathology/teach/VA/case\\_1/frmst.html](http://www.le.ac.uk/pathology/teach/VA/case_1/frmst.html)

## PATHOLOGY DIDACTICS

Pathology Exercises and Mini-tutorials, University of Utah

<http://www-medlib.med.utah.edu/WebPath/webpath.html>

University of Wisconsin Medical Pathology

<http://www.biostat.wisc.edu/educ/path/path703.html>