

Pathology of Human Disease (HST 034/035 and HBTM 200) Spring 2024

Course Director:

Scott Lovitch, MD, PhD
(slovitch@bwh.harvard.edu)

Teaching Fellows:

Jasmin Joseph-Chazan
(jasminjoseph@fas.harvard.edu)

Alexandra Hochstetler
(Alexandra.Hochstetler@childrens.harvard.edu)



Course Information

Subject No.	HBTM 200
Subject Title:	Pathology of Human Disease
Offered:	Spring semester (HST academic calendar)
Credits:	16 MIT units (4 hours of lecture; 2 hours of lab; 10 hours of preparation per week) H-level graduate credits. <i>Note: This subject is equivalent to HST 030/031 (Human Pathology). Students cannot receive credit for both courses.</i>
Pre-requisites:	7.01 (or equivalent experience); 7.05 (or equivalent) recommended but not required. For Harvard undergraduates, LS1a/1b (or equivalent experience; may be taken concurrently); MCB 60 or equivalent is recommended but not required. <i>Note: Undergraduate enrollment is limited with preference given to seniors. Undergraduates interested in enrollment should consult with the course director and with their concentration advisor.</i>
Grading:	Letter grading (see note). <i>Note: Some HST students have the option to register under HST 034 for Pass/Fail grading (please consult HST policies to determine if you qualify for P/F option). All other MIT and Harvard students must register under HST 035 or HBTM 200 for letter grading. Harvard students should consult departmental policies for rules regarding translation of MIT grades into the Harvard grading scheme.</i>
Website:	https://canvas.harvard.edu/courses/127394
Meeting times:	Lectures: Tuesdays and Thursdays, 9-11 AM Labs: Thursdays 11 AM-1 PM
Meeting location:	Lectures: TMEC 250 Labs: TMEC 202/203/204/206
Course Summary:	This course provides a comprehensive overview of human pathology, with emphasis on mechanisms of disease and modern diagnostic methods. 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. Course objectives 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.

Faculty

Course Director

Scott Lovitch, MD, PhD

Associate Pathologist
Brigham and Women's Hospital
Assistant Professor of Pathology
Harvard Medical School

Contact: slovitch@bwh.harvard.edu

Teaching Fellows

Jasmin Joseph-Chazan

Graduate Student in Immunology
Leder Human Biology and Translational
Medicine Program
Harvard Medical School

Contact: jasminjoseph@fas.harvard.edu

Alexandra Hochstetler

Postdoctoral Fellow (Lehtinen Lab)
Boston Children's Hospital

Contact:
Alexandra.Hochstetler@childrens.harvard.edu

Guest Faculty

Sanda Alexandrescu, MD

Staff Pathologist
Boston Children's Hospital
Instructor in Pathology
Harvard Medical School
Sanda.Alexandrescu@childrens.harvard.edu

Li Chai, MD

Associate Director, Joint Program of Adult
Transfusion Medicine
Brigham and Women's Hospital
Associate Professor of Pathology
Harvard Medical School
lchai@bwh.harvard.edu

Guest Faculty (continued)

Lauren Choate, PhD

Associate Cytogeneticist
Center for Advanced Molecular Diagnostics
Brigham and Women's Hospital
Instructor in Pathology
Harvard Medical School
lchoate@bwh.harvard.edu

Guillermo Garcia-Cardena, PhD

Associate Professor of Pathology
Brigham and Women's Hospital
Center for Excellence in Vascular Pathology
Harvard Medical School
ggarcia-cardena@bwh.harvard.edu

Jonathan N. Glickman, MD, Ph.D.

Director of Gastrointestinal Pathology
Massachusetts General Hospital
Associate Professor of Pathology
Harvard Medical School
jglickma@bidmc.harvard.edu

Maria K. Lehtinen, Ph.D.

Assistant Professor of Pathology
Boston Children's Hospital
Harvard Medical School
Maria.Lehtinen@childrens.harvard.edu

Mohini Lutchman, Ph.D.

Lecturer in Neurobiology
Harvard Medical School
mohini_lutchman@hms.harvard.edu

Faisal Mahmood, Ph.D.

Division of Computational Pathology
Brigham and Women's Hospital
Assistant Professor of Pathology
Harvard Medical School
Associate Member, Broad Institute of
Harvard and MIT
faisalmahmood@bwh.harvard.edu

Guest Faculty (continued)

Amanda Martinot, DVM, MPH, Ph.D.

Research Fellow
Center for Virology and Vaccine Research
Beth Israel Deaconess Medical Center
Instructor in Pathology
Harvard Medical School
amartino@bidmc.harvard.edu

Richard Mitchell, MD, Ph.D.

Professor of Pathology and Health
Sciences and Technology
Brigham and Women's Hospital
Harvard Medical School
rmitchell@rics.bwh.harvard.edu

Robert Padera, MD, Ph.D.

Staff Pathologist
Brigham and Women's Hospital
Assistant Professor of Pathology
Harvard Medical School
rpadera@bwh.harvard.edu

Natalie Rizzo, MD

Associate Pathologist
Brigham and Women's Hospital
Instructor in Pathology
Harvard Medical School
nrizzo3@bwh.harvard.edu

Sam Sadigh, MD

Associate Pathologist
Brigham and Women's Hospital
Instructor in Pathology
Harvard Medical School
ssadigh@bwh.harvard.edu

Frederick J. Schoen, MD, Ph.D.

Executive Vice Chairman
Department of Pathology
Brigham and Women's Hospital
Professor of Pathology and Health
Sciences and Technology (HST)
Harvard Medical School
fschoen@bwh.harvard.edu

Lynette M. Sholl, MD

Associate Pathologist
Brigham and Women's Hospital
Assistant Professor of Pathology
Harvard Medical School
lmsholl@bwh.harvard.edu

Isaac H. Solomon, MD, Ph.D.

Associate Pathologist
Brigham and Women's Hospital
Instructor in Pathology
Harvard Medical School
ihsolomon@bwh.harvard.edu

Kimberley Springer, MD

Deputy Chief Medical Examiner
Commonwealth of Massachusetts
kimberley.springer@state.ma.us

Guillermo J. Tearney, MD, Ph.D.

Mike and Sue Hazard Family MGH Research
Scholar
Professor of Pathology
Harvard Medical School
Wellman Center for Photomedicine
Massachusetts General Hospital
gtearney@partners.org

Paul A. VanderLaan, MD

Director of Cytopathology and Thoracic
Pathology
Beth Israel Deaconess Medical Center
Assistant Professor of Pathology
Harvard Medical School
pvanderl@bidmc.harvard.edu

David Walt, Ph.D.

Professor, Howard Hughes Medical Institute
Core Faculty Member, Wyss Institute for
Biologically Inspired Engineering
Senior Pathologist
Brigham and Women's Hospital
Member of the Faculty of Pathology
Harvard Medical School
dwalt@bwh.harvard.edu

HBTM 200 Course Schedule

Spring 2024

<i>Date/Time</i>	<i>Topic</i>	<i>Instructor</i>	<i>Room</i>
Tues Jan 30			
9-9:30	Course Introduction	Lovitch	TMEC 250
9:30-11	Cell Injury and Adaptation, and the Host Response to Cell Death	Mitchell	TMEC 250
Thurs Feb 1			
9-11	Tissue Injury and Repair	Mitchell	TMEC 250
11-1	Lab: Cellular and Tissue Response to Injury	Mitchell/ Padera	TMEC 2 nd floor skills area
Tues Feb 6			
9-11	Pathology of Cancer I	Lovitch	TMEC 250
Thurs Feb 8			
9-11	Pathology of Cancer II	Lovitch	TMEC 250
11-1	Lab: Pathology of Cancer	Lovitch	TMEC 2 nd floor skills area
Tues Feb 13			
9-11	Hematopoiesis, Hematology, and Heme Malignancies	Sadigh	TMEC 250
Thurs Feb 15			
9-11	Pathology of Infectious Disease	Solomon	TMEC 250
11-1	Lab: Infectious Disease Pathology	Solomon	TMEC 2 nd floor skills area
Tues Feb 20			
9-10	Next-Generation Sequencing and Personalized Medicine	Sholl	TMEC 250
Thurs Feb 22			
9-11	Hematopoietic Stem Cells and Transfusion Medicine	Chai	TMEC 250
11-11:30	<i>Introduction and Orientation to Student Presentations</i>	<i>Lovitch/ Joseph-Chazan/ Hochstetler</i>	<i>TMEC 250</i>
11:30-1	Lab: Tour of BWH Pathology Department and Clinical Labs		Meet in TMEC 250
SUNDAY, FEBRUARY 25: PROBLEM SET #1 POSTED			

Tues Feb 27			
9-11	Pulmonary Pathology	VanderLaan	TMEC 250
11-12:30	Office Hours	Lovitch/ Joseph-Chazan/ Hochstetler	TMEC 250
Thurs Feb 29			
9-11	Cardiovascular Pathology	Padera	TMEC 250
11-1	Lab: Cardiovascular and Pulmonary Pathology	VanderLaan/ Padera	TMEC 2 nd floor skills area
SUNDAY, MARCH 3: PROBLEM SET #1 DUE ELECTRONICALLY BY 11:59 PM			
Tues March 5			
9-11	GI Pathology I: Alimentary Tract	Glickman	TMEC 250
Thurs March 7			
9-11	GI Pathology II: Liver, Biliary Tract, and Pancreas	Glickman	TMEC 250
11-1	Lab: GI Pathology	Glickman	TMEC 2 nd floor skills area
March 9-17 Harvard Spring Break – No Class			
Tues March 19			
9-11	Pathology of the Kidney and Urinary Tract	Rizzo	TMEC 250
Thurs March 21			
9-11	Pathology of the Reproductive System	Rizzo	TMEC 250
11-1	Lab: Reproductive and Genitourinary Pathology	Rizzo	TMEC 2 nd floor skills area
Tues March 26			
9-11	Pathology of Neurodegeneration	Hochstetler	TMEC 250
11-12:30	Optional Immunology Boot Camp	Anthony	TMEC 250
Thurs March 28			
9-11	Forensic Pathology	Springer	TMEC 250
11-1	Lab: Tour of Brigham and Women’s Hospital Center for Advanced Molecular Diagnostics		Meet in TMEC 250
SUNDAY, MARCH 31: PROBLEM SET #2 POSTED			

Tues April 2			
9-11	Developmental Neuropathology	Lehtinen	TMEC 250
11-12:30	Office Hours	Lovitch/ Joseph-Chazan/ Hochstetler	TMEC 250
Thurs April 4			
9-11	Neuropathology of Cancer	Alexandrescu	TMEC 250
11-1	Lab: Neuropathology	Lehtinen/ Alexandrescu/ Hochstetler	TMEC 2 nd floor skills area
SUNDAY, APRIL 9: PROBLEM SET #2 DUE ELECTRONICALLY BY 11:59 PM			
Tues April 9			
9-11	Machine Learning, Artificial Intelligence, and Computational Pathology	Mahmood	TMEC 250
11-1	Special Office Hours to Discuss Final Presentation Topics	Lovitch/ Joseph-Chazan/ Hochstetler	TMEC 250
Thurs April 11			
9-11	Cytogenetics and Cytogenomics	Choate	TMEC 250
11-1	No Lab – hold as snow makeup date		
FRIDAY, APRIL 12: PRESENTATION TOPIC/SUMMARY DUE ELECTRONICALLY BY 11:59 PM			
Tues April 18			
9-11	Student Presentations		TMEC 250
Thurs April 20			
9-10	Student Presentations		TMEC 250
10-11	Non-Invasive Diagnostic Imaging	Tearney	TMEC 250
11-1	Anatomy Lab #1	Lutchman	TMEC 4 th floor anatomy suite
Tues April 23			
9-11	Vascular Endothelial Dysfunction and Atherosclerosis	Garcia-Cardena	TMEC 250
Thurs April 25			
9-11	Biomaterials and Implantable Devices: Mechanisms, Challenges, and Opportunities for Research and Innovation	Schoen	TMEC 250
11-1	Anatomy Lab #2	Lutchman	TMEC 4 th floor anatomy suite
SUNDAY, APRIL 28: PROBLEM SET #2 POSTED			

Tues April 30			
9-11	Animal Models of Human Disease	Martinot	TMEC 250
11-12:30	Office Hours	Lovitch/ Joseph-Chazan/ Hochstetler	TMEC 250

Thurs May 2			
9-11	Student Presentations		TMEC 250
11-1	Bovine Heart Dissection and Cardiac Imaging Lab	Mitchell/ Padera/ Lovitch	TMEC 2 nd floor skills area

SUNDAY, MAY 5: PROBLEM SET #3 DUE ELECTRONICALLY BY 11:59 PM			
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Tues May 7			
9-11	Commercializing Translational Science: Bridging the Gap between Bench and Bedside	Walt	TMEC 250

Thurs May 9			
9-12	Student Presentations		TMEC 250
12-12:30	Concluding Remarks	Lovitch	TMEC 250

Textbooks and References

Required Textbooks:

Required reading for lectures related to cellular and organ system pathology are assigned from:

1. Kumar et al., Robbins & Cotran Pathologic Basis of Disease, 10th edition, WB Saunders, 2020.
2. Young et al., Wheater's Functional Histology, 6th ed, Churchill Livingstone, 2013.

Full text of both of these textbooks is available online via the Countway Library website, <https://www.countway.harvard.edu/>. Although only selected sections of these books are assigned as required reading (see course website), students are highly encouraged to read as much of these books as possible.

NOTE: Additional required reading for some lectures will be in the form of lecture notes, reviews or original articles. These materials are provided online or distributed in class.

Additional Useful Sources (not required for the course):

Pathology:

1. **Robbins Basic Pathology** (Saunders, 2012) is a “baby” version of Robbins and Cotran, and may be used as an alternative text for those who are looking for less detail.
2. Wheater’s Basic Histopathology (Churchill Livingstone, 2002) is a favorite of many medical schools and provides a very basic introduction to histopathology.
3. Robbins and Cotran Atlas of Pathology (Saunders, 2006) is a picture book of gross pathology and good for browsing on a slow day in the library! (Hint!)

Histology:

Basic Histology: Text and Atlas (McGraw-Hill, 2005) is an alternative to Wheater’s and recommended for those interested in learning more about normal histology.

Cell Biology:

Molecular Cell Biology (W.H. Freeman, 2007) and **Molecular Biology of the Cell** (Garland, 2007) are bibles of cell biology and recommended for those interested in learning more about biology of the cells at the molecular level.

Immunology:

1. **Basic Immunology** (Saunders, 2008) is a great introductory book and a must read for anyone interested in the immune system and its associated diseases. Alternatively, the book’s full version **Cellular and Molecular Immunology** (Saunders, 2007) provides a much more comprehensive study of immunology.
2. **Immunobiology** (Garland, 2007) is another outstanding source for the study of immunology, and a serious alternative to Cell and Molecular Immunology.

Grading and Requirements

A numerical score for each student will be determined based on the following three components:

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. Participation in each of these activities will be measured by various methods throughout the semester and ongoing feedback will be given to the class. If you have two or more unexcused absences from lectures/labs, it will result in a one-half-letter-grade reduction of your final grade at the end of the semester.

Problem Sets (30% or 50%): There will be three assigned throughout the course. Problem sets are designed to help you master course material.

Final presentation (30% or 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. Students are free to choose their topic or select from a list of recommended references. Most importantly, please do not recycle presentations from your current research or previous work!

Grading of presentations will be based on the following criteria:

- Demonstration of Knowledge of Pathology
- Interpretation of Data/Application of Diagnostic Methods
- Significance/Relevance/Creativity
- Presentation (clarity, style, timing)

The total numerical score for the course will be calculated with problem sets accounting for 30% of the course grade and the final presentation accounting for 50%, and vice-versa. The letter grade awarded for the course will be based on the higher of the two scores.

Each student's final letter grade for the course will be determined based on the above numerical score. For MIT students, the official transcript will show the final grade as ABC or P/F. Nevertheless, +/- designations are provided to the HST academic office and may be transferrable to the Harvard transcript in some circumstances.

Expectations of Students

1. Students are expected to come to lecture having read the materials in advance, as they may provide material that will be discussed in lecture. *Note: the material in the required readings is also subject to being tested in the problem sets.*
2. Attendance to every lab and lecture is mandatory.
3. Failure to attend lab or lecture due to an unexcused absence will severely impact the overall course grade. Two unexcused absences for lecture will result in a reduction by ½ grade level. Any missed lecture must be covered by watching the video and writing a one page synopsis that is to be handed into the TA within one week of missing the lecture.
4. Only excused absences will be considered: an example of an excused absence is a medical emergency and must be accompanied by a doctor's note OR other situations that will be determined by the course instructors. If you know you will not be able to attend a tutorial session or lecture, you must notify the Teaching Assistant AND Course Director in advance OR within 24 hours following the end of missed class.
5. Three problem sets will be posted throughout the semester and are generally due the following week (7 days). Working with others on your problem sets is permitted. Please note who you worked with on the problem set, and note that the answers must be your own. Late problems sets will be accepted with a legitimate excuse, but may not get full credit.

Classroom Courtesy: As a courtesy to all the members of our classroom community, please turn off your cell phones and keep your side conversations to a minimum.

Laptops will be permitted to be used during class, but those found abusing this privilege will no longer be allowed to have a laptop in class.

Academic Integrity: All work in this course is governed by the academic integrity policies of GSAS (<https://gsas.harvard.edu/codes-conduct/academic-integrity>) and HMS (<https://mastersstudenthandbook.hms.harvard.edu/409-academic-dishonesty-and-plagiarism>). It is the students' responsibility to be aware of these policies and to ensure that their work adheres to them both in detail and in spirit. Unless otherwise specified by the instructor, the assumption is that all work submitted must reflect the student's own effort and understanding. Students are expected to clearly distinguish their own ideas and knowledge from information derived from other sources, including from collaboration with other people. If you have a question about how best to complete an assignment in light of these policies, ask the instructor for clarification.

Reasonable Accommodations

As an institution that values diversity and inclusion, our goal is to create learning environments that are usable, equitable, inclusive and welcoming. Harvard University complies with federal legislation for individuals with disabilities and offers reasonable accommodations to qualified students with documented disabilities and temporary impairments. To make a request for reasonable accommodations in a course, students must first connect with their local disability office. The primary point of contact for GSAS students is the Accessible Education Office (www.aeo.fas.harvard.edu). The HMS Director of Disability Services, Timothy Rogers (timothy.rogers@hms.harvard.edu) is another potential source of accommodation information for PhD students and is the primary contact for MD and master's students.

Accommodations are determined through an interactive process and are not retroactive. Therefore, students should contact their local disability office as soon as possible, preferably at least two weeks before accommodations are needed in a course. Students are strongly encouraged to discuss their access needs with their instructors; however, instructors cannot independently institute individual accommodations without prior approval from the disability office. Student privacy surrounding disability status is recognized under FERPA. Information about accommodations is shared on a need-to-know basis, and with only those individuals involved in instituting the accommodation.

Academic and other Support Services

We value your well-being and recognize that as a graduate student you are asked to balance a variety of responsibilities and potential stressors: in class, in lab, and in life. If you are struggling with experiences either in- or outside of class, there are resources available to help. Jackie Yun, the GSAS Director of Student Services (617-495-5005) is available to assist students navigating academic or personal difficulties and to connect students to university resources. HILS PhD students have access to free academic tutoring which can be arranged through the DMS office. A variety of academic support services are also available to GSAS students through the Bureau of Study Counsel (<https://bsc.harvard.edu/>) and the Center for Writing and Communicating Ideas (<https://gsas.harvard.edu/center-writing-and-communicating-ideas>).

All students have access to Counseling and Mental Health Services (CAMHS) available in Longwood, Cambridge or remotely via webcam or phone. The use of CAMHS is included in the student health fee, regardless of insurance, at no additional cost. More information is available at <https://camhs.huhs.harvard.edu> or by calling the main office at 617-495-2042. Urgent care can be reached 24/7 at 617-495-5711.