CH 107
Science and Practice of Medicine

– Syllabus Fall 2019 –

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Location	Anderson 309
Meeting Times	Wednesday, 1:30 – 4 pm
Office Hours	Wednesday (when class is held), 11 am – 1:15 pm at Kindlevan Café, SEC

Course Description

This course is an introduction to the biomedical sciences and their application to clinical medicine and public health. It's cross-disciplinary nature makes it unlike any traditional science course (e.g., human physiology, genetics or epidemiology) you may have taken in college. We begin with a focused overview of key pathophysiologic processes most relevant to the care of individual patients and the protection of populations. This involves concise overview of current biological explanations for health and disease. Next, we investigate how doctors think about their patients, make decisions on their behalf, and gauge the success of their interventions. We primarily accomplish this by collecting clinical information from patients (well, actually, health college students) and interpreting this information in order to make a diagnosis and recommend treatment. Finally, we explore how physicians and other health personnel go about protecting the health of entire populations though clinical and public health interventions.

There are no formal prerequisites for taking this course. However, a basic understanding of normal cell and tissue biology is assumed. If your last exposure to this sort of material was in high school, you may find the first part of the course challenging. Chapter 2 of the textbook (see below) helpfully covers this content. Subsequent chapters on pathophysiology are written in more detail than we require, and I will make it clear in class what is most relevant for our

purposes and what is not. Please let me know, sooner rather than later, if you anticipate any difficulty learning this material.

Learning Objectives

By the end of the course, you will be able to:

- Explain why all humans (and other life forms) die and the vast majority experience disease during their lifetimes
- Identify the socioeconomic, behavioral, biological, and environmental factors that impact human health and contribute to health disparities
- Describe the underlying physiology or pathophysiology involved in cellular adaptation to stress, inflammation, immunity, infectious disease and neoplasia
- Describe the hierarchy of medical evidence and characterize the inherent tension between evidence-based medicine and clinical practice
- Explain the underlying principles underlying clinical reasoning and identify major factors affecting clinical decisions in the care of patients
- Identify the ethical and professional parameters defining the patient-physician relationship
- Perform a focused medical interview and describe the components of a complete history and physical examination
- Develop a differential diagnosis, ascertain a final diagnosis, and propose a treatment plan based to clinical data collected from a patient
- Describe clinical manifestations, diagnostic evaluations, management strategies and preventive interventions (clinical and population-based) for several common medical conditions
- Distinguish between population-based and clinically-based strategies to lower the incidence of illness or injury (and their associated mortality), and develop a proposal for integrating the two approaches to serve a defined population
- Describe the basic processes, approaches and interventions that identify and address the major health-related needs of populations

Student Responsibilities

Class Engagement

Your enthusiastic participation in class discussion is essential for the success of any course this size. Please come prepared by completing the reading assignments before class. We will be using Polleverywhere (classroom response system) to help incentivize your participation.

Reading Assignments

The textbook for the course is *Crowley's An Introduction to Human Disease*. It is available for online purchase at VitalSource or at the campus bookstore. Other readings are linked to the relevant sessions on Canvas. Be sure to prepare for each session by reading the assigned chapter or article as depicted in the course schedule (see below).

Clinical Simulation Project

Part A – Patient Portrayal

For the first part of this project, you and a random classmate will pair up and conduct a realistic patient-physician encounter. This will involve acting out the role of a patient seeking the services of a physician for an active medical condition. You and your partner will take turns portraying both roles. To get started, you must first choose 3 medical conditions from the Diagnostic List, which you'll find on Canvas under Assignments > Session 2. You can view the diagnoses from A-Z or by subcategory. Use this survey form to submit your 3 options in order of preference by the start of Session 2 on Sep 11. Just the names of the conditions will suffice. Most students get their first choice, and I will confirm this within a week.

Once you have your diagnosis, you are to prepare the role of a patient suffering from this condition, which you will perform during the History and Physical Exam Exercise (Session 7 on Oct 23). To create a ***realistic*** clinical case, you will need the following information concerning your patient and their condition:

- **Etiology and risk factors.** These are the demographic characteristics (e.g., age, sex), genes (family history), environmental/occupational exposures (e.g., toxins, pathogens, trauma), social factors (e.g., income, education, race/ethnicity), and/or health behaviors (e.g., diet, exercise, tobacco use) that are believed to cause (etiology) or increase the chances (risk factor) of acquiring the condition.
- **Clinical presentation.** These include the symptoms (expressed by the patient) and signs (observed by a clinician) associated with a typical, moderately severe case of the condition.

The textbook is a good place to begin your research, but you'll need to use other resources as well (see Resources Section below). For the sake of this assignment, assume that your character has never seen a health care provider in the past for this problem. This means they will **not** know the results of diagnostic tests or previous treatments. To get a sense of the kind of information your physician will be seeking, review the *Overview of History Taking and the Physical Exam* document (linked to Session 6 on Canvas).

Patient Portrayal Video. Once you've completed your research, your first task is to produce a 6 – 12 minute video in which you personally play the role of your patient. At the very beginning

(before assuming the role of your character) state your actual full name and patient's diagnosis. The video should consist of three scenes (suggested length):

- **Scene 1: The Problem.** (2-3 min) Show your character experiencing the major symptom(s) of their condition in context. For example, you could portray a teen with asthma having a bout of wheezing and shortness of breath while exercising, or a middle-aged woman with depression appearing sad and distracted at work. You are free and encouraged to use other "actors" if they will enhance your portrayal.
- **Scene 2: The Medical Interview.** (3-7 min) Show your character being interviewed by a physician in a clinical setting (e.g., exam or hospital room). This should include all relevant components of a complete history (excepting a full review of systems, which may be omitted): history of present illness, past medical history (including medications), family history, social history, and lifestyle (health behaviors). You will need to provide a script for the physician, who may be seen on camera or only heard off camera. Be sure to consider how your patient (and physician, if present) would actually look (e.g., clothing, hygiene, signs of illness; white coat, scrubs, stethoscope). With a little creative editing, some students have managed to portray both roles.
- **Scene 3: The Physical Exam Report.** (1-2 min) In lieu of conducting an actual physical exam (which probably won't be very revealing), switch to the physician's role in this last scene and recount the ***relevant*** findings from the physical exam. This should include the general appearance of the patient, their vital signs (even if normal), and any other aspect of the exam that you think is important to the case (i.e., specific findings from the cardiac, pulmonary, neurologic exams, etc.). Do not mention what tests you would order, what you think the diagnosis is, or the treatment plan – ***these come later***. Finally, do not use this scene to simply recap the findings from the history, and be sure to use only ***scientific terminology*** (e.g., patella instead of kneecap or myocardial infarction instead of heart attack) befitting of an actual physician.

The video is due by the start of Session 7 on Oct 23. Since it is designed to prepare you for the History & Physical Exercise that same afternoon, no extensions are permitted. (A list of references is not required.) The best way to submit your video is by creating an ***unlisted*** YouTube channel. The unlisted designation means that no one can see your video unless you provide them the link. Please follow these steps:

1. Create a YouTube account (if you don't already have one)
2. Click on the Create a Video or Post icon in the top right corner and select Upload Video
3. Underneath Select Files to Upload, change "public" to "unlisted"
4. Upload file from your computer
5. Once uploaded, cut and paste the video URL in the HTML space on Canvas under Assignments > Session 7

Please make every effort to be as ***creative and realistic*** as possible. The assignment is worth 15 points, 5 of which will be awarded for creativity, realism and production effort. The top 4

patient portrayals will be nominated for an Academy Award, and your fellow students will vote on who should receive the Oscar after a screening of nominee videos at the end of the course.

IMPORTANT
DO NOT DISCLOSE YOUR DIAGNOSIS AT ANY TIME TO YOUR CLASSMATES OR ANYONE ELSE

History & Physical Exercise. Your next task is to portray your patient in class. During the first part of Session 7, a random classmate, disguised as your physician, will take a detailed history and perform a ***mock*** physical exam on your patient character. Because of your video, you'll be ready to comfortably step into your patient's role and anticipate any question your physician might ask. Even so, you may not have all the answers. If you are unsure of how to respond to a question, I'll be available as a "consultant". You may wish to bring note cards to help you remember certain facts about the case.

When it is your turn to be the physician, you will perform a thorough history (excluding the review of systems) and mock physical exam. Since your patient will (most likely) not actually have the condition in question, they will need to provide you with physical exam findings when asked. After inquiring about your patients' general appearance and specific values for each of the 4 vital signs, systematically go through all components of the physical exam, asking the patient to describe in detail any abnormalities. Be sure to obtain the kind of information you researched for your own patient portrayal as described above, using the *Overview of History Taking and the Physical Exam* document as a guide. Remember that your fellow student may be aware of appropriate diagnostic tests, but they will ***not*** have the results, so ***don't*** ask for them. You will have roughly 20 minutes to complete your evaluation.

Part B – Clinical Simulation Report

Based on the information you collected from the history and physical exam you performed on your patient, write up a report organized into the following 5 sections (approximate length):

- **Case synopsis.** (½-1 page) Briefly describe the ***most relevant*** clinical findings you uncovered about your patient. Be sure to divide this section into ***2 separate parts***: Historical Findings (first) and Physical Exam Findings (second). Take care to avoid extraneous information having no direct bearing on the case; however, do not forget about pertinent negatives (e.g., no history of abdominal surgery in a patient presenting with abdominal pain). When discussing the physical exam, be sure to report ***actual values*** for vital signs and fully describe all relevant findings (rather than simply writing, for example, "abnormal"). ***Do not*** include normal findings superfluous to your differential diagnosis.
- **Differential diagnosis (DDx).** (1-1½ pages) List 3-4 hypothesized diagnoses and provide a one-paragraph rationale for the inclusion of each based on the data you collected and described above. Be sure each diagnosis is sufficiently distinct from the others (e.g., do not

include emphysema and chronic bronchitis as two out of the three possibilities, since both are subtypes of chronic obstructive pulmonary disease).

- **Diagnostic work-up.** (1-1½ page) Propose diagnostic tests you would order to help narrow your DDx and provide a brief justification for each, accounting for their risks (e.g., inaccuracies, adverse effects) and relative costs (no need to provide actual dollar values). Try to include information regarding the sensitivity and specificity of each test. Be as ***specific as possible*** (e.g., do not simply write "blood work", but specify exactly which blood test(s) you mean). ***Don't be wasteful*** – order only those tests necessary to make a proper diagnosis. Sometimes diagnostic testing will not be necessary. If this is the case, be sure to explain why. Remember that diagnostic tests include not only blood work or imaging studies, but other interventions as well (e.g., neuropsychiatric evaluation for mental disorders.)
- **Final diagnosis.** (½-1 page) Identify and justify your patient's most likely diagnosis given the clinical information you collected (from the history ***and*** physical exam) and results of any diagnostic tests you ordered. Since you can't actually run these tests, you will need to make up results that are supportive of your final diagnosis and unsupportive of the other possibilities in your DDx. Again, be sure to provide ***actual*** values or descriptions of these test results.
- **Treatment recommendations.** (1-1½ page) Now that you've arrived at a final diagnosis, propose a plan to manage your patient's condition. Consider all possible therapeutic interventions (e.g., time and reassurance, behavior modification, pharmaceuticals, physical therapy, psychotherapy, surgery, etc.). Be sure to explicitly consider the treatments' effectiveness, risks and relative costs when making your recommendations. Cite at least ***2 controlled trials*** (the best and most recent you can find) supporting the effectiveness of your key treatment recommendation.

Submit your paper on Canvas under Assignments > Clinical Simulation Report by ***1:00 pm on Nov 13***. It should be ***4–6 pages long, single-spaced*** (12-point Calibri font or similar) and organized using the 5 subheadings indicated above (remember to divide the case synopsis into two parts: history and physical findings). Please submit ***Word documents only*** (not Page or pdf). Cite at least 6 different references (not included in page limit) and use APA-style, in-text citations. See instructions regarding sources and citations below. Your paper will be evaluated for accuracy/completeness (80%) and writing quality/references (20%). Take care to remove all grammatical and typographical errors before submitting your paper and be sure to use only ***scientific terminology***.

Interactive Team Presentations

For this team-based project, you will develop an evidence-based, cost-efficient proposal to lower the prevalence of a health-related condition occurring somewhere in the world. You may choose a topic from the list below or identify your own (with pre-approval). The proposal must combine **clinically-based and population-based** strategies to serve a specific, pre-defined population. Each team will present their proposal to the class during Session 11 (Nov 20). You

are free to form teams and choose a topic at any time prior to Session 8 (Oct 30), at which point remaining teammates and topics will be randomly assigned. There can be no duplication of topics.

Presentation should be 20 minutes in length (give or take 2 min) and consist of the following four sections:

- **Rationale for Action.** Create support for your proposal by documenting the prevalence of the problem in a clearly defined population and describing its impact on the quality of life for those affected. Help your audience understand the problem by describing the biologic, behavioral, social and/or environmental factors contributing the problem. Finally, identify a measurable goal you hope to achieve within a specific time frame (e.g. X% reduction of Y in Z years).
- **Clinically-Based Strategy*.*** Describe how your goal ***could*** be achieved by using physicians and other clinical professionals. Consider any and all clinical interventions that could conceivably contribute to the success of the project (e.g., behavioral counseling, pharmaceuticals, surgery, rehabilitation, etc.)
- **Population-Based Strategy**. Describe how your goal ***could*** be achieved by using public health services and other population-based approaches. Consider the full range of interventions operating outside the traditional scope of clinical services that could conceivably contribute to the success of the project.
- **Final Proposal.** Clearly and concisely outline your final proposal, which should incorporate only the most promising (but ***not*** every) clinical and population-based interventions identified above. Briefly explain why you are recommending these particular interventions while discounting the others (e.g., probability of impact, efficient use of resources, potential for harm). Finally, identify one major obstacle that threatens to derail the success of your proposal.

Your presentation must include PowerPoint (or similar) slides along with any other audio or video media you would like to incorporate. Be sure to interactively engage your audience by (1) posing questions (e.g., about the nature of the problem you plan to address or what they consider to be the most promising interventions), and/or (2) conducting polls (e.g., Polleverywhere of Kahoots). Take care to remove all grammatical and typographical errors before submitting your paper and be sure to use only ***scientific terminology***. Be sure to include a reference slide (or two) at the end of your presentation. Plan for five minutes of questions and discussion following your formal remarks.

Presentations will be evaluated according to their accuracy/completeness (60%), proposals' prospect of success (20%), and communication quality (20%). Have one member of your team submit the final version of your slides on Canvas under Assignments > Interactive Team Presentations by 1:00 pm on Nov 20.

Topic Choices

Abortions in young women
Opioid related deaths in chronic pain sufferers
Lower extremity amputations in type 2 diabetics
Asthma in inner city neighborhoods
Infant mortality among minority women
Hepatitis C mortality
Multi-drug resistant TB mortality
Intimate partner violence
Suicide among adolescents
Traffic-related mortality

Quizzes and Final Exam

There will be two online quizzes and a final exam consisting of short answer, fill-in-the-blank, and multiple-choice questions. They will occur according to the schedule below:

	Opens at 1:30 pm on	Closes at 1:30 pm on	Duration	Covers
Quiz 1	Oct 1	Oct 2	90 mins	Sessions 1-4
Quiz 2	Nov 5	Nov 6	90 mins	Sessions 5-8
Exam	Dec 12	Dec 14	3 hrs	Sessions 1-10

Although you may use any written resource you wish, I strongly suggest you stick to the material covered in the course. You ***may not*** consult with any other human beings, including classmates, ***until after*** the quizzes or exam closes**.**

Important Notes Regarding Assignments and Exam

Sources. Since the reliability (accuracy and timeliness) of information available on the Internet varies considerably, it is best to rely exclusively on peered-reviewed literature. Peer-reviewed sources include textbooks, journal articles, and databases subscribed to by the Hirsh Health Sciences Library (HHSL). Since other sources are insufficiently reliable to be used for academic papers, you may only cite peer reviewed sources for your Clinical Simulation Report and Interactive Team Presentation. See the table below for examples of acceptable and unacceptable sources.

Cite These	Don't Cite These
• All journals available through PubMed or Ovid Medline • All textbooks available through HHSL	• Wikipedia • Medline Plus • WebMD

• All databases available through the HHSL • US Preventive Services Task Force • The Cochrane Library	• Mayo Clinic • National Institutes of Health • American Cancer Society • Any newspaper or magazine

A list of suggested resources can be found at the end of the syllabus. Please use APA style formatting for references and in-text citations.

Authorship. Plagiarism is the unacknowledged use or inadequate citing of someone else's work. It is important to note that plagiarism does not need to be intentional. It is your responsibility to learn the rules of citing and documenting sources and to conduct your research carefully. (For more information, please see HHSL Plagiarism Research Guide.) As a class, we will be using Turnitin for the Clinical Simulation Report to determine the originality of your work. TurnItIn is an automated system that instructors can use to quickly and easily compare each student's assignment with billions of websites, as well as an enormous database of student papers that grows with each submission. When papers are submitted to TurnItIn, the service will retain a copy of the submitted work in the TurnItIn database for the sole purpose of detecting plagiarism in future submitted works. Students retain copyright on their original course work. (For more information, see Turnitin.com or review Tufts' Academic Integrity policies). ***Please note:*** If your similarity score is > 10%, you will be given one chance to rewrite and resubmit your paper (within one week) with a 20% score deduction. If the similarity score for the resubmission remains > 10%, you will not receive credit for the assignment.

Extensions. You may have a 48-hour extension on the Clinical Simulation Report without a score deduction as long as I approve your extension request ***prior to*** the due date. Without prior approval, or after 48 hours with approval, 0.5 points will be deducted for each additional day (including weekends) your report is late. No extensions are permitted for the Patient Portrayal Video or Interactive Team Presentation slides.

Accommodations. Tufts is committed to providing equal access and support to all qualified students through the provision of reasonable accommodations so that each student may fully participate in the Tufts experience. If you have a disability that requires reasonable accommodations, please contact the Student Accessibility Services office at Accessibility@tufts.edu or 617-627-4539 to make an appointment with an SAS representative to determine appropriate accommodations. Please be aware that accommodations cannot be enacted retroactively.

Course Schedule

Ssn	Date	Topics / Events	Assignments (Due Before Start of Class)
Part 1 – Scientific Basis of Health and Disease			
1	Sep 4	Why We Get Sick ***SYTYCD Opener***	• Read syllabus
2	Sep 11	How We Stay Well: Cellular Adaptation, Inflammation and Immunity	• Select 3 diagnoses for Clinical Simulation • Read Pathophysiology Text:* Chp 2 (p 38-43), 5 (p 93-104), 6 (p 107-9, 127-39)
3	Sep 18	How We Get Sick I: Infectious Diseases	• Read Pathophysiology Text: Chp 8 (p 179-81, 190-205), Chp 9 (p 209 only), Chp 10 (p 225-28)
4	Sep 25	How We Get Sick II: Neoplasia	• Read Pathophysiology Text: Chp 7 (p 145-164)
Part 2 – Practice of Medicine			
5	Oct 2	Thinking Like a Doctor I: Evidence in Medicine	• Read article: *On Framing the Research Question and Choosing the Appropriate Research Design* • ***Complete Quiz 1 by 1:30 pm***
	Oct 9	Religious Holiday – no class	
6	Oct 16	Making the Diagnosis I: Clinical Data Collection	• Read Article: *Overview of History & Physical Exam* • Read Pathophysiology Text: Chp 1 (p 2-5), 11 (p 249-56)

7	Oct 23	***History & Physical Exam Exercise*** Making the Diagnosis II: Diagnostic Technology	• Submit Patient Portrayal video • Read Pathophysiology Text: Chp 1 (p 5-20)
8	Oct 30	Thinking Like a Doctor II: Clinical Reasoning	• Read Article: *Decision Making* (p 1-24) • Choose teams and topics for Interactive Presentations
Part 3 – Population Health			
9	Nov 6	Preventing Disease I: Patients vs. Populations	• Read Article: *Prevention of Illness* • ***Complete Quiz 2 by 1:30 pm***
10	Nov 13	Preventing Disease II: Integrated Cases	Read Pathophysiology Text: Chp 7 (p 163-73), 10 (p 237-44), 11 (p 276-84)
11	Nov 20	Interactive Team Presentations	
	Nov 27	Thanksgiving Break – no class	
Course Conclusion			
12	Dec 4	Course Review ***Patient Portrayal Awards*** ***SYTYCD Finale***	Submit presentation slides or link thereto
	Dec 11	Extra Office hours 10-1:00 pm	
	Dec 12-14	***Final Exam***	

*See Canvas Assignments for section titles

Grading Policy

Points will be distributed as follows:

Assignment	Points
Clinical Simulation Project*	40
Interactive Team Presentation	15
Quizzes x 2	20
Final Exam	25
Total	100

*Video 15 / Report 25

Extra Credit

You will not have the option to redo any work or submit additional work. However, the following extra credit points are available:

Tournament winners	2 points
Tournament runners-up	1 point
Oscar winner	2 points
Class participation	1 point

Maximum extra credit points per student: 4

Grade Distribution

≥ 97	A+
93-96	A
90-92	A-
87-89	B+
83-86	B
80-82	B-
77-79	C+
73-76	C
70-72	C-
67-69	D+
63-66	D
60-62	D-

If the average score for all students is < 82.5, a curve will be applied.

Resources

Most of these resources are available through links from the HHSL homepage.

Textbooks

If these links don't work, go to HHSL homepage and click Find > eBooks. In the search box, type in the title of the book.

Current Medical Diagnosis and Treatment 2020

DeGowin's Diagnostic Examination 10e

Medical Epidemiology: Population Health and Effective Health Care 5e

Symptom to Diagnosis: An Evidence-Based Guide 3e

Wallach's Interpretation of Diagnostic Tests: Pathways to Arriving at a Clinical Diagnosis 10e

Databases

US Preventive Services Task Force

Essential Evidence Plus

The Cochrane Library

After clicking link, click on the name of these databases under Quick Links:

Dynamed Plus

Ovid Medline

Pubmed