2023

BIOM 4110(Honors)/6110: The Science of Medicine (Syllabus)

Bradford D. Pendley
University of Memphis

The Science of Medicine: BIOM 4110(H)/6110

Fall, 2023

Tu/Th 1:00-2:25: ET 200

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DESCRIPTION: In this course you should develop an ability to apply your knowledge of physics, chemistry, biology, engineering and mathematics to solve problems in medicine. The nature of the course requires you to enhance your ability to identify pertinent data as well as integrate and apply scientific concepts to solve medical problems. In addition, you should also develop the skill to read the primary literature and apply these concepts learned to solve problems. This class may be of interest to students planning a career in medicine or biomedical engineering.

GOALS: The goals that you should work towards are;

1. To demonstrate an ability to identify, formulate, and solve problems encountered in medicine by applying principles of engineering, science, and mathematics.
2. To demonstrate quantitative reasoning skills and use appropriate mathematical tools to solve medical problems;
3. To demonstrate an ability to integrate concepts in biology, chemistry, mathematics and physics by solving applied problems in medicine

TEXT: None. However, you may find it helpful to refer to introductory textbooks in biology/physiology, chemistry, and physics as needed.

EVALUATION: There will be four examinations and one comprehensive final examination during the semester. Each of these will count 200 points. The total number of points you attained on these exams determines your final grade.

Grade	Total points
A- / A/ A+	900-1000
B- / B / B+	800-899
C- / C / C+	700-799
D / D+	600-699
F	below 600

In addition to the course requirements described in the syllabus, students will demonstrate their ability to learn independently by reading a specified article posted on Canvas on a topic related to the material discussed in each block but not assigned to the rest of the class. You will have two (2) questions on each of the first four exams on that topic (i.e., 10% of the grade on each of these exams). This reading will not be discussed in class, nor will practice questions be given, but the instructor is available to answer questions initiated by the student.

Eighty percent of your final exam will be comprehensive in nature while twenty percent will come from questions that you missed on previous exams. If you correctly answer any or all of the questions that you had missed previously, you will not only receive full credit for the problem on the final exam, but you will also receive back all credit you lost for that problem on the original exam. Thus, it is possible for you to recover up to 40 points (i.e., 20% of 200 points) on the final exam.

POLICIES: My expectation is that you will attend all classes unless directed otherwise. There will be regular in-class discussions and problem sets and I expect that you will complete these assignments in a timely manner. None of these assignments are graded; they are to help you learn. These assignments are the minimum I believe is necessary for an average student to learn to apply scientific concepts to medical problems. If you are unable to attend a class, it is your responsibility to obtain all material discussed and assignments given. You are permitted to make an audio recording of the lecture only if you receive my permission beforehand. This is for your personal use only and is never to be posted online, sold or disseminated. The same is true (i.e., posting online, selling or disseminating) for any PowerPoint presentations or YouTube videos.

You will be allowed to make up a missed exam *only* with an excused absence. Normally, these reasons would include medical emergencies, a death in your family, or required University of Memphis event (e.g., athletic team travel). It is your responsibility to coordinate with me when you take the make-up exam and respond promptly to all of my emails. If the absence is not excused, or if you fail to respond promptly to take the make-up exam, you will receive zero points for the exam. If at all possible, please let me know ahead of time if you are not able to take an exam at its scheduled time so that we can arrange another time for you to take it. Your work on exams must be pledged to be your own and free of any and all examples of academic misconduct including using outside resources such as your notes, the PowerPoint presentations, other individuals or the internet. You are also required to turn in your first three exams no later than when you take the fourth exam so that I may select questions for the individualized portion of your final exam. If you are unable to locate one or more of your previous exams and turn them in, I will not be able to select questions for the individualized portion of your final exam and you will not be eligible to make back points on your final exam. For each exam you are unable to return to me, you will lose the ability to recover 10 points and I will ask you a question from a previous exam you answered correctly.

Any student who may need class or test accommodation based on the impact of a disability is encouraged to contact Disability Resources for Students (DRS) at 110 Wilder Tower, 678-2880. DRS coordinates accommodations for students with documented disabilities.

Drop/add dates for classes are listed on the Registrar's website.

SCHEDULE OF CLASSES

Day	Date	Topic
Tu	8/29	Class introduction, expectations
Th	8/31	Scientific inquiry and medicine
Tu	9/5	Quantitative reasoning
Th	9/7	Statistical inferences and tools
Tu	9/12	Statistical inferences and tools
Th	9/14	**EXAM 1**
Tu	9/19	Biomolecules and cellular structure and function
Th	9/21	Structure and function of organ systems
Tu	9/26	Structure and function of organ systems
Th	9/28	Structure and function of organ systems
Tu	10/3	Structure and function of organ systems
Th	10/5	Structure and function of organ systems
Tu	10/10	**EXAM 2**
Th	10/12	Physics of movement
Th	10/19	Physics of movement; physics of flow
Tu	10/24	Bioelectricity: action potentials and cardiac conduction
Th	10/26	Interactions of light with matter and diagnostic imaging
Tu	10/31	Interactions of light with matter and diagnostic imaging
Th	11/2	Optics of vision
Tu	11/7	**EXAM 3**
Th	11/9	Homeostasis and the kidney
Tu	11/14	Homeostasis and the kidney
Th	11/16	Acid-base balance in the body
Tu	11/21	Acid-base balance in the body
Tu	11/28	Transport, metabolism, kinetics and pharmacology
Th	11/30	Transport, metabolism, kinetics and pharmacology
Tu	12/5	**EXAM 4**
Th	12/14 10:30am-12:30pm	**FINAL EXAM**