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2023

BIOM 1720: Introduction to Biomedical Engineering Tools (Syllabus)

Stephen Strain

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Hello! I am Dr. Strain. Welcome to BIOM 1720. We will meet in ES 222. Please feel free to contact me with any questions, concerns, etc. that you might have.

I look forward to hearing from you!

For class business, use University email only—I cannot record verbal discussions after class, so if, for instance, you have an issue with attendance or assignment due dates, send an email. Do not send messages through other students; instead, communicate directly with me by email. My address is sfstrain@memphis.edu. Please include “BIOM 1720” in the subject line when you write.

Instructor

Dr. Stephen Strain

sfstrain@memphis.edu

Office: ET308

Virtual Office: <https://memphis.zoom.us/j/3271381594?pwd=VW9FYThrS293d0FwYUZ2TVFyeVJLdz09>

Office hours: Monday and Wednesday 2:15-3:30P, or email for appointment

Teaching Assistant: Juan Esparza (jpsparza@memphis.edu)

Course Description: Use of computer tools for data analysis, presentation, documentation; introduction to programming; individual and group design projects. COREQUISITE: ENGR 1010.

This course is required for the Biomedical Engineering Degree Program.

Required Materials:

- Internet Access
- Desktop Computer, Laptop, or Tablet
- Canvas (memphis.instructure.com)

University resources to support online learning:

<https://www.memphis.edu/uofmglobal/students/online-intro.php>

Interactive Textbook (required): *Programming in MATLAB*, zyBooks.com

1. Click any zyBooks assignment link in your learning management system (DO NOT go to the zyBooks website and create a new account)
2. Subscribe

A personal computer is required. A laptop with MS Windows 10 or higher is highly recommended.

Required software: MATLAB, Microsoft Word, and Microsoft Excel.

A free MATLAB download is available for UM students through the university's site license at <https://www.mathworks.com/academia/tah-portal/university-of-memphis-40714972.html>

MS Word & Excel is available for UM students through the university's technology access program at

<https://www.memphis.edu/umtech/solutions/software/software.php>

Course Learning Outcomes

- Use algorithms and logic to design computer programs in a high-level programming language (MATLAB)
 - Make use of arrays/matrices
 - Develop custom functions
 - Implement graphing in two dimensions
- Become familiar with various areas of biomedical engineering including biomechanics, biomaterials, and bioelectricity
 - Make physiologic and material measurements
 - Use physiologic models
 - Gain understanding of integration of mathematics and physical sciences in engineering
- Become skilled at technical documentation and report writing

Course Topics

- MATLAB programs and built-in functions
- MATLAB input/output and plotting
- MATLAB logical functions and control structures
- Tensile testing of biomaterials
- Technical writing
- Data analysis and graphical presentation
- Team project incorporating MATLAB

Grading

-- %	Attendance (pass/fail)
20%	Homework
20%	Individual Technical Reports
15%	Team Project
15%	Exam 1
15%	Exam 2
15%	Final Exam

Letter grades will be determined as below, with plus/minus modifiers for A, B, or C grades and plus modifier for D grade. Modifiers (eg A+ or C-) are applied if numerical grade is above X7.5% or below X2.5%. I reserve the right to round up or down or otherwise adjust the final grade based on other factors such as attendance, effort, and engagement inside and out of class.

A: (90-100); B (80-89); C (70-79); D (60-69); F (<59)

Note: The grading scheme may be revised as required during the term.

Attendance (pass/fail)

In order to be successful in this class, attendance is MANDATORY. You are allowed at most three unexcused absences.

If you have a health condition that prevents you from regular class attendance, you MUST register with Disability Resource Services (see **Student Accommodations** below) and contact me to discuss an alternative plan ASAP.

- Attendance at all class meetings is required.
- You are allowed three unexcused absences.
- **A fourth unexcused absence will result in an “F” for the course.**
- Absences will be excused **at my discretion**, for instance, for circumstances such as illness, personal/family emergency, academic/professional commitments, etc. must be documented via an email to Dr. Strain. Student athletes may provide scheduled absences for athletic events per usual methods. Email me at sfstrain@memphis.edu if you wish an absence to be considered for excusal.

Homework (20%)

Homework consists of required assignments and must be submitted as directed on Canvas (memphis.instructure.com). Homework assignments will not be accepted via email. Homework assignments are graded and must be turned in by the specified deadline. Approximately three (3) homework grades will be dropped, allowing for such circumstances as time management issues or inadequate preparation. Late assignments may be accepted for other special circumstances at the discretion of the instructor.

Technical Reports (20%)

Individual technical reports are required. These reports will be based on laboratory activities completed during class. Instruction on technical writing and report rubrics will be provided. Drafts will be turned in first, and feedback will be provided. This will resemble the peer review process. Then revisions must be made and a revised, final report turned in.

- **Failure to revise the final report according to the draft feedback will result in a penalty of at least a letter grade on the final report.**
- **Failure to turn in the final report will result in an “F” for the course.**

Team Project (15%)

A team project is required. Detailed instructions, deliverables, and grading scheme will be provided. Teammates will be assigned by the instructor.

Exams (45%)

Three (3) exams will be given; two during the semester and a final exam. The final exam is not comprehensive; however, MATLAB topics build upon previous topics and the final exam will include topics from previous exams. Exam dates will be posted to Canvas.

Honors Section

If you are enrolled in BIOM 1720-350, you are in the Honors section. If you are enrolled in BIOM 1720-001, you are enrolled in the regular (non-Honors) section. Honors students must complete the course requirements listed above as well as an additional activity that will be assigned towards the end of the term. The assignment will be graded on a pass-fail basis. If the honors assignment is not completed or if it receives a failing grade, the maximum final grade in the course will be B-.

Policies

1. Attendance is REQUIRED. See above for attendance policy.
2. You are responsible for all material, whether covered in class or as part of an assignment. If you miss a class, you are responsible for obtaining any material covered in class.
3. You are expected to come to class prepared and to participate actively in class. This participation may include, but not be limited to, explanation or demonstration of concepts, in-class problem solution, or discussion of assignments. Volunteers for participation may be solicited, or you may be called upon.
4. I will often use Zoom to record a class lecture, but this is NOT for remote attendance. Unless university policy changes, you must attend class face to face. For questions, contact me at sfstrain@memphis.edu.
5. There will be regular assignments, and many of them will be graded. You are expected to complete and understand all assignments, whether they are graded or not.
6. Except when teamwork is specifically required, any work submitted for a grade must be your own original work. Working together on assignments is certainly acceptable and encouraged, but each person must work through the problem individually. **Do not simply copy someone else's solution. Do not electronically share your assignment files with classmates.**
7. Assignments must be turned in by the due date in Canvas. All assignments must be submitted via Canvas unless otherwise stated—I cannot accept assignments by email. You may contact me at sfstrain@memphis.edu regarding late assignments, but an extension will be granted **only** at my discretion and is NOT guaranteed.

8. No make-up exams will be given. If your absence from an exam is officially excused (documentation required), an alternate exam grade (eg final exam grade) will be substituted for the missing exam. A grade of zero will be assigned for a missed exam in all other cases.
9. Academic dishonesty and disruptive behavior of any form will not be tolerated. See the *Code of Student Rights and Responsibilities* at www.memphis.edu/studentconduct. See the section on Academic Integrity below.
10. You are responsible for determining the availability of the computing resources used in this class and for scheduling your work accordingly.
11. You must fully comply with all university guidelines and applicable laws regarding the use of computing facilities and software that may be provided for this course.
12. You should bring your own laptop to class. The computer and wireless usage policy is as follows: **(a) Checking email and social websites, surfing, gaming, or other activities not directly related to the assigned task is not appropriate. (b) Cell phone usage, including text messaging, is not appropriate at any time during class unless instructed to do so.**
13. Please treat the classroom environment as you would for any professional situation: Be on time, be prepared, be respectful, do not disrupt or distract others.
14. These policies may be revised or augmented as required during the term.

Academic Integrity

The University of Memphis expects all student to behave honestly. The Code of Student Rights & Responsibilities explains what constitutes a violation of our Academic Integrity policy. Please see the website for more information: <https://www.memphis.edu/osa/>. Plagiarism, cheating, and other forms of academic dishonesty are prohibited. Students who violate the academic misconduct policy, either directly or indirectly, through participation or assistance, are immediately responsible to the instructor of the class in addition to other possible disciplinary sanctions which may be imposed through the regular institutional disciplinary procedures.

COVID-19 Health and Safety Policy: Please read and follow all University policies regarding coronavirus safety and prevention listed at <https://www.memphis.edu/coronavirusupdates/>. Current university policy asks that all faculty, students, and staff follow current CDC recommendations:

- If you were exposed to someone who had COVID or later tested positive:
<https://www.cdc.gov/coronavirus/2019-ncov/your-health/if-you-were-exposed.html>
- If you have COVID:
<https://www.cdc.gov/coronavirus/2019-ncov/your-health/isolation.html>

Student Health

Students who are experiencing symptoms such as sneezing, coughing or a higher than normal temperature should inform me by email so they can be excused from class and should stay home. Students should contact their health care provider or the Student Health Center at <https://www.memphis.edu/health>.

Student Accommodations

Students with accessibility issues or learning accommodation issues due to a disability should contact Disability Resources for Students (DRS) to submit an official request for course accommodations. Contact DRS at 901.678.2880 or at drs@memphis.edu. (<https://www.memphis.edu/drs/index.php>)

Student Resources

Students who need additional resources can contact the Dean of Students Office at <https://www.memphis.edu/deanofstudents/crisis/index.php>.

Note: Policies may be revised during the term at the instructor's discretion.