



BME 512: Engineering Physiology Lab II
School of Engineering and Science
Spring 2025

Instructor:

Dr. Rachel Jones
Contact Info:
rjones4@stevens.edu

Office Hours:
Wednesday 2-4 pm
Or by appointment (preferred)

Teaching Assistants:

Erfan Sarhaadei
esarhaad@stevens.edu
Office Hours: TBD

Gina Polack
gpolack@stevens.edu
Office Hours: TBD

Meeting Times: Section A – Wednesdays – 11:00 a.m. - 1:50 p.m.

Section B – Mondays – 2:00 p.m. - 4:50 p.m.

Section C – Mondays – 11:00 a.m. - 1:50 p.m.

COURSE DESCRIPTION

This is a continuation of BME 512. This laboratory course serves as an interactive introduction to human physiology from an engineering perspective. Students will learn to apply knowledge of mathematics, science, and engineering to physiology. The course also addresses societal and ethical responsibility associated with the development, testing, and implementation of biomedical devices or treatments. Some labs will use Simulink (MATLAB) to model physiological phenomena as control systems, and some labs will involve hands on experience with medical devices to measure and analyze various biosignals. Topics to be covered are outlined below in the tentative schedule.

STUDENT LEARNING OUTCOMES

After successful completion of this course, students will be able to...

- Design and solve physiological models using mass balance and differential equations in Simulink. (ABET SO 2)
- Analyze and interpret experimental data from bioelectric transducers (EMG, Foot Pressure systems) and can draw conclusions regarding medical applications of each. (ABET SO 6)

- Discuss the societal and economic impact biomedical devices/approaches have on the diagnosis/treatment of physiological pathologies. (ABET SO 4)
- Actively participate on a team to collaborate to establish goals and meet objectives. (ABET SO 5)

COURSE FORMAT AND STRUCTURE

Course Logistics

Classes will be held on campus, in person during the normal scheduled class time. Material will include a lecture on background material, in class time to record data/start Simulink Models, and interactive learning experiences.

Class participation is expected during scheduled class time. Labs will be completed in small groups (3-5 students) and you will have class time to work together.

Please let me know if you need accommodations or if you have suggestions about other modifications we can make to our course. This will be a team effort!

There will be class time provided to work on most of these assignments. *Following the course schedule below, details about this work and the grading procedures are included.*

All assignments must be submitted through CANVAS **by the due date and time specified on CANVAS**

TENTATIVE COURSE SCHEDULE

| Date | Topic |
|----------------------------|---|
| Week 1: 1/20-1/24 | NO LAB THIS WEEK |
| Week 2: 1/27-1/31 | Electrocardiogram & Heart Sounds |
| Week 3: 2/3-2/7 | Cardiovascular Physiology – Response to exercise |
| Week 4: 2/10-2/14 | Blood Pressure & Statistical Analysis |
| Week 5: 2/17-2/21* | NO LAB – PRESIDENT’S DAY NOTE: Wednesday is a Monday Schedule – NO LAB |
| Week 6: 2/24-2/28 | Diffusion Lab setup |
| Week 7: 3/3-3/7 | Diffusion Lab measurements |
| Week 8: 3/10-3/14 | Pulmonary Physiology – Pulmonary Function Tests Group 1 (split into two groups) |
| Week 9: 3/17-3/21** | No Class: Spring Break |
| Week 10: 3/24-3/28 | Pulmonary Physiology – Pulmonary Function Tests Group 2 (split into two groups) |
| Week 11: 3/31-4/4 | Gas Exchange – Anaerobic Threshold Group 1 (split into two groups) |
| Week 12: 4/7-4/11 | Gas Exchange – Anaerobic Threshold Group 2 (split into two groups) |
| Week 13: 4/14-4/18 | Group Presentations |
| Week 14: 4/21-4/25 | NO LAB – all reports due |
| Week 15: 4/28-5/2 | Practical Final |

Schedule is subject to change at any time – check CANVAS for updates

The schedule and topics of each lab are subject to change at any time due to equipment availability and capabilities of both faculty and students. Updates will be made via CANVAS if changes are to occur.

COURSE MATERIALS

Textbook(s): There is no assigned textbook.

Other Readings: There are reading materials provided on CANVAS

Materials: **Matlab, including Simulink is required.** Laptops will be required for all classes.

COURSE REQUIREMENTS

Attendance:

Attendance is required. Except for emergency situations, if you will miss class for an excused reason (determined by the instructor), advanced written notice to the instructor is required by the business day before the class you will miss. If there is a medical reason for you to miss class, you could be asked for documentation. Your participation grade will depend on your attendance.

Participation:

20% of your grade will be based upon in-class participation. In addition to the lab reports, you are required to fill out a group work survey to give feedback on how much each group member participated in the lab. Completion of these surveys and their results will impact your participation grade. Without an excused absence, if you are not present in class, you will not be able to earn these participation points.

Lab Reports/Homework/Quizzes:

60% of your grade will be based upon on-time lab report and presentation submissions. Most lab assignments will be due 1 hour prior to class. Only one team member will need to upload a report – which will be graded for all members of the group (I will make groups that will be the same throughout the semester). They will be uploaded through canvas. Plagiarism is a serious offense that will not be tolerated.

Filenames should follow the convention: “BME513_Lab#_ LastNameStudent1_...”. For example, “BME513_Lab1_Tucci_Zaferiou”. **Files should be submitted in PDF format.**

Practical Final:

20% of your grade will be based on a final exam that will consist of the student creating MATLAB scripts and Simulink diagrams based on prompts given by the instructor. Students will not be able to use the internet, or the help function during the exam, however they can use their engineering notebook.

GRADING PROCEDURES

Grades will be based on:

| | |
|----------------------|------|
| Class Participation | 20 % |
| Lab Reports/Homework | 60 % |
| Final | 20% |

Late Policy:

Without prior written approval from the instructor, late submissions of assignments will not be accepted (you will receive a zero as a grade).

Other Policies:

- No cellphone use is permitted during meetings.

ACADEMIC INTEGRITY

Generative AI Technologies

You may use AI programs e.g. ChatGPT to help generate ideas and brainstorm. However, you should note that the material generated by these programs may be inaccurate, incomplete, or otherwise problematic. Beware that use may also stifle your own independent thinking and creativity.

You may not submit any work generated by an AI program as your own. If you include material generated by an AI program, it should be cited like any other reference material (with due consideration for the quality of the reference, which may be poor).

Any plagiarism or other form of cheating will be dealt with under relevant Stevens policies.

Undergraduate Honor System

Enrollment into the undergraduate class of Stevens Institute of Technology signifies a student's commitment to the Honor System. Accordingly, the provisions of the Stevens Honor System apply to all undergraduate students in coursework and Honor Board proceedings. It is the responsibility of each student to become acquainted with and to uphold the ideals set forth in the Honor System Constitution. More information about the Honor System including the constitution, bylaws, investigative procedures, and the penalty matrix can be found online at <http://web.stevens.edu/honor/>

The following pledge shall be written in full and signed by every student on all submitted work (including, but not limited to, homework, projects, lab reports, code, quizzes and exams) that is assigned by the course instructor. No work shall be graded unless the pledge is written in full and signed.

"I pledge my honor that I have abided by the Stevens Honor System."

Reporting Honor System Violations

Students who believe a violation of the Honor System has been committed should report it within ten business days of the suspected violation. Students have the option to remain anonymous and can report violations online at www.stevens.edu/honor.

Graduate Student Code of Academic Integrity

All Stevens graduate students promise to be fully truthful and avoid dishonesty, fraud, misrepresentation, and deceit of any type in relation to their academic work. A student's submission of work for academic credit indicates that the work is the student's own. All outside assistance must be acknowledged. Any student who violates this code or who knowingly assists another student in violating this code shall be subject to discipline.

All graduate students are bound to the Graduate Student Code of Academic Integrity by enrollment in graduate coursework at Stevens. It is the responsibility of each graduate student to understand and adhere to the Graduate Student Code of Academic Integrity. More information including types of violations, the process for handling perceived violations, and types of sanctions can be found at <https://my.stevens.edu/provost/grad-academics-and-student-success>.

Special Provisions for Undergraduate Students in 500-level Courses

The general provisions of the Stevens Honor System do not apply fully to graduate courses, 500 level or otherwise. Any student who wishes to report an undergraduate for a violation in a 500-level course shall submit the report to the Honor Board following the protocol for undergraduate courses, and an investigation will be conducted following the same process for an appeal on false accusation described in Section 8.04 of the Bylaws of the Honor System. Any student who wishes to report a graduate student may submit the report to the Dean of Graduate Academics or to the Honor Board, who will refer the report to the Dean. The Honor Board Chairman will give the Dean of Graduate Academics weekly updates on the progress of any casework relating to 500-level courses. For more information about the scope, penalties, and procedures pertaining to

undergraduate students in 500-level courses, see Section 9 of the Bylaws of the Honor System document, located on the Honor Board website.

LEARNING ACCOMMODATIONS

Stevens Institute of Technology is dedicated to providing appropriate accommodations to students with documented disabilities. The Office of Disability Services (ODS) works with undergraduate and graduate students with learning disabilities, attention deficit-hyperactivity disorders, physical disabilities, sensory impairments, psychiatric disorders, and other such disabilities to help students achieve their academic and personal potential. They facilitate equal access to the educational programs and opportunities offered at Stevens and coordinate reasonable accommodations for eligible students. These services are designed to encourage independence and self-advocacy with support from the ODS staff. The ODS staff will facilitate the provision of accommodations on a case-by-case basis.

For more information about Disability Services and the process to receive accommodations, visit <https://www.stevens.edu/student-diversity-and-inclusion/disability-services>. If you have any questions please contact the Office of Disability Services at disabilityservices@stevens.edu or by phone: 201.216.3748.

Disability Services Confidentiality Policy

Student Disability Files are kept separate from academic files and are stored in a secure location within the Office of Disability Services. The Family Educational Rights Privacy Act (FERPA, 20 U.S.C. 1232g; 34CFR, Part 99) regulates disclosure of disability documentation and records maintained by Stevens Disability Services. According to this act, prior written consent by the student is required before our Disability Services office may release disability documentation or records to anyone. An exception is made in unusual circumstances, such as the case of health and safety emergencies.

INCLUSIVITY

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Name and Pronoun Usage

As this course includes group work and class discussion, it is vitally important for us to create an educational environment of inclusion and mutual respect. This includes the ability for all students to have their chosen gender pronoun(s) and chosen name affirmed. If the class roster does not align with your pronouns and/or name, please inform the instructor of the necessary changes.

Religious Holidays

Stevens is a diverse community that is committed to providing equitable educational opportunities and supporting students of all ethnicities and belief systems. Religious observance is an essential reflection of that rich diversity. Students will not be subject to any grade penalties for missing a class, examination, or any other course requirement due to religious observance. In addition, students will not be asked to choose between religious observance and academic work. Therefore, students should inform the instructor at the beginning of the semester if a requirement for this course conflicts with religious observance so that accommodations can be made for students to observe religious practices and complete the requirements for the course.

MENTAL HEALTH RESOURCES

Part of being successful in the classroom involves a focus on your whole self, including your mental health. While you are at Stevens, there are many resources to promote and support mental health. The Office of Counseling and Psychological Services (CAPS) offers free and confidential services to all enrolled students who are struggling to cope with personal issues (e.g., difficulty adjusting to college or trouble managing stress) or psychological difficulties (e.g., anxiety and depression). Appointments can be made by phone (201-216-5177), online at <https://stevensportal.pointnclick.com/confirm.aspx>, or in person on the 2nd Floor of the Student Wellness Center.

EMERGENCY INFORMATION

In the event of an urgent or emergent concern about your own safety or the safety of someone else in the Stevens community, please immediately call the Stevens Campus Police at 201-216-5105 or on their emergency line at 201-216-3911. These phone lines are staffed 24/7, year-round. For students who do not reside near the campus and require emergency support, please contact your local emergency response providers at 911 or via your local police precinct. Other 24/7 national resources for students dealing with mental health crises include the