

## Summer 2026 BMED 3110

### Quantitative Engineering Physiology Laboratory I

**Instructors:** [Charles W. \(C.W.\) Peak](#), Office hour: TBD

**Teaching Assistant:** TBD

TA Office hour location: Whitaker 4<sup>th</sup> floor learning commons

**Lectures:** *All lectures will be asynchronously delivered. It is our expectation that you review lecture materials in a timely fashion.*

**Lab:** *All labs in UAW 0246 and are 4:15 in length with break. The lab meets every T and R for half summer term. Lab start time is 8:00 AM. The Lecture is asynchronous.*

**Pre-reqs:** BMED 3100, BMED 3410, (BMED 2400 or CEE / ISYE 3770)\*, and CS 1371

\*statistics is a prerequisite with concurrency -- see Teams section of syllabus for implications

### What you will learn this semester

- Develop the ability to read and apply knowledge gained from scientific literature selected based on your curiosity
- As a team, generate an original idea that can be tested on human participants by connecting insights gained from reading scientific literature.
- Design experiments that address the original idea in a human participant study
- Develop sensors and instrumentation that allows design of experiment to address objectives of an original idea
- Statistically analyze, and interpret experimental data from human participants to inform further work
- Address the challenges associated with the interaction between living systems and non-living materials and systems when designing and conducting experiments
- Communicate the value of an original team-based experimental design project through oral and written communication.
- Recognize the value of learning from a diverse team of peers

### How this is linked to BME Curriculum

BMED 3110 is one of several courses in our curriculum that focus on developing students' entrepreneurial mindset (EM). When faculty in BME talk about 'EM' they don't just mean starting a company. Instead, when we talk about EM, we want students to develop several elements that we call the 3Cs:

- **Be Curious** – we want our graduates to understand the broader world, look towards the future, and explore multiple perspectives when solving problems.
- **Make Connections** – we want our graduates to think outside the box, put old ideas into new contexts, and connect information together in novel ways to generate insights.
- **Create value** – we want our graduates to seek out opportunities, understand the impact of their work on all stakeholders, and work in ways to maximize their impact on society

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While this can happen in ANY course, this course is designed to create specific opportunities to develop your EM. You will likely find the 3Cs most obvious in the pre-lab proposal presentation and the final report.

You may also notice a focus on stories in these EM courses. Whether from the final reflection assignment where you will write a letter to an underclassman BME student or another experience you have in this class, we strongly encourage you to think about things that have a good story attached. Those stories are a way of helping you reflect on and communicate your own growth and share what you can do with others. They are also useful as you look for your first job, prepare for grad school admissions, or take whatever your next step is. We have a class at the end of the BME curriculum, BMED4000, where we help you develop those stories to make them impactful both on your sense of yourself and how others understand you.

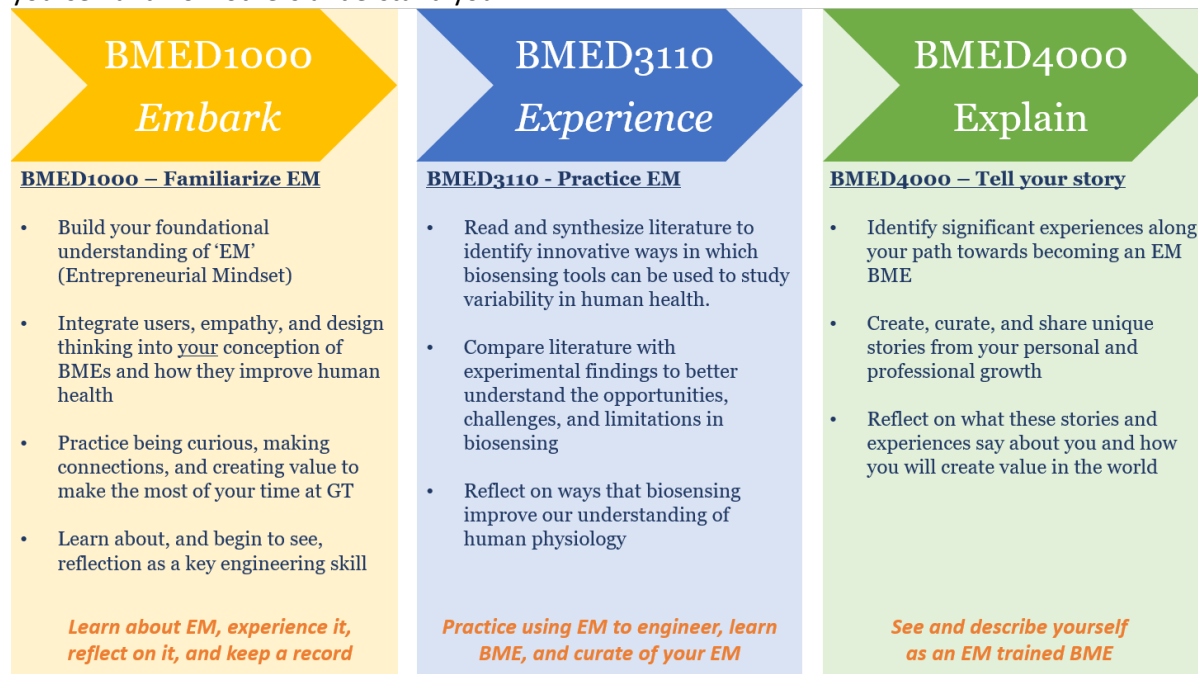


Figure 1. Describes how BMED 1000, BMED 3110, and BMED 4000 are linked together.

### Expectations

This is a hands-on lab that is taught, in part, away from the UAW lab space. We believe in hands-on learning and want you to have the best learning opportunity possible. Especially in our current environment, it is critical that you prepare and participate.

- We expect you to engage with provided content.
- Be on time to meetings (Lab, team meetings, troubleshooting sessions)
- Act with integrity and not cheat. If you cheat individually, you will get a zero. If one person cheats in a team, we will send the case to OSI to adjudicate.
- Help us be better instructors. If we do a bad job explaining something, let us know.
- Treat all of your classmates with kindness. There will be several peer-review assignments. You can provide constructive positive or negative feedback. Make sure it's constructive.
- If you show symptoms of any illness, stay home. You or your team, for team-based assignments, can request an extension up to 24 hours before the due date. Requests for extensions beyond 72 hours will only be considered under special circumstances.

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- During the semester, it is possible that you have a major disruption in your life. We do not need to know the details but know that we are willing to work with you. We do, however, expect you to communicate with us by email or in person as soon as possible so that we can put a good working plan in place.

### What you will need

Your team will need to pick up a BMED 3110 Bioamplifier kit from the library. It is important that only one member of each team get an amplifier. Note that you will need this amplifier for the rest of the semester. Failure to return it to the library will result in a \$50 fee to your Bursar account.

You will also need to provide a USB-C cord to connect the kit to the computer. This cord is not provided in the kit.

To get ready for the labs, download and install Arduino Software at:

<https://www.arduino.cc/en/Main/Software>.

If you are using a Mac and find yourself unable to detect the Arduino serial (USB) port, you likely need to install CH340 drivers: <https://learn.sparkfun.com/tutorials/how-to-install-ch340-drivers/all>

Depending on your project, it is likely that you will have to purchase Ag/AgCl electrodes for your final project. Here is [one option](#). Here is another [option](#).

### How can we communicate

You may email us any time and include “BMED 3110:” in the subject line. Please suggest an agenda if you’d like to meet. We will also use MS Teams as a communication portal between the instructional team and you.

### Peer Discussion

You are encouraged to pose general questions to and start conversations with the BMED 3110 community as a whole through our MS Teams site. The discussion should be used for help understanding particular concepts, finding/using functions in MATLAB or modules in Python, and constructive feedback for presentations and the like. If you are having a problem, it is likely that someone else has the same issue.

### TA discretion/Participation

We want you to be a good citizen of this course. **Throughout the semester you will be asked to provide evidence of your good participation, usually about 5-10 times.** Things like contributing to class or section wide discussions, team activities, being prepared, viewing async lectures or anything else that identifies you as a good citizen. Preparation and completion of quizzes on async lecture material also constitutes good participation. You can also lose participation points. Examples of losing points include not showing up to lab or team meetings, being unprepared or asking questions directly addressed in asynchronous content, etc.

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### Grading

Your grades will be posted under the grades section of Canvas. Table 1 below describes the breakdown of grades

**Table 1.** Assignments, whether team or individual effort/submission/grading, and number of points.

Assignment	Team / Individual	Points
Module 1: Modified ChatGPT Protocol for ECG Characterization	Team	2
Module 1: ECG Processed Data Reflection	Individual	5
Module 1: HRV abstract and figure	Team	5
Module 2: Literature Searching and Journal club presentation	Individual	10
Module 3: Human subjects & compliance quiz and CITI Training	Individual	3
Module 3: EMG Physiology & Experimental Design (Project Proposal)	Team	15
Module 4: Final poster presentation	Team	5
Module 4: Final report	Team	25
Engagement (e.g. daily updates, participation, etc.)	Individual	10
Peer review and reflection (journal club, pre-lab, poster presentation, and final reflection)	Individual	10
Team notebook (checkpoints, increasing amounts)	Team	10
<b>Total Points</b>		<b>100</b>

Where a grade of A  $\geq$  90., B  $\geq$  80., C  $\geq$  70., D  $\geq$  60., and F < 60

Rubrics are provided for each deliverable via Canvas. They are designed to be informative and will walk you through the requirements of the deliverables. Please use them!

### Planning

#### Asynchronous Lectures

A variety of content will be available via asynchronous lecture. The lectures are intended to be concise discussions of narrowly defined topics. Several of these lectures will be mandatory, and you will have to choose from several more. Your knowledge of these will be quizzed in class. You will be notified of any required lecture material before the relevant quiz dates. In total, there will be six participation quizzes throughout the course of the semester; your lowest quiz grade will be dropped.

#### Notebooks

Team notebooks are a way to help you keep organized. Each **team** will maintain an electronic notebook within MS teams. **Notebook checks occur randomly.** Your team notebook must be organized, up-to-date, and reproducible. There will be a final notebook check after the poster session.

#### Grading questions

Late Assignments turned in past their due date will be graded with a penalty for the assignment.

Assignments turned in up to one day past the due date will receive 75 percent of the raw overall grade.

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Assignments turned in up two days late will receive 50 percent of the raw overall grade. Any assignments turned in two days or more past the due date will be given a zero. Teams may request extensions on some assignments by obtaining written approval from a TA or the instructors, if requested at least 24 hours in advance.

Grading questions and concerns should be brought to your professors' or TAs' **attention no later than one week after feedback on the graded assignment**. Submit your grade dispute by emailing the original graded work along with an in-depth description of the dispute, and **the entire assignment may be reevaluated at the end of the term**. This may increase or decrease the overall score, and submission of a grade dispute does not guarantee that points will be awarded. Late disputes or disputes not prepared according to requested format will not be accepted.

### Teamwork

Teamwork is an essential part of this course, where most deliverables are team-based. Deliverables require student teams to use their individual strengths to efficiently complete deliverables. Skill sets important for this course include systems physiology, software programming, statistics, circuits and instrumentation, oral and written communication. It is not critical that you are highly skilled in all these aspects, but a team that includes some level of proficiency in each will improve your experience in this course.

At the beginning of the semester, you will self-select teams, in part based on skill sets. We encourage you to take the time to get to know each other early and often. Find out strengths and work styles. We believe that this time spent will pay dividends by the end of the semester. We encourage you to have open conversations with your team, particularly when issues arise. We are happy to serve as non-judgmental mediators – we are skilled in that! Do not wait too long hoping your concerns will resolve themselves on their own. You can include a team contract and modify it any time with all team members' consent. You always have the option to leave or be fired from your team, but we take this seriously and want you to have the best learning experience possible.

### Accommodations for Students with Disabilities

If you are a student with learning needs that require special accommodation, contact the Office of Disability Services at (404)894-2563 or <http://disabilityservices.gatech.edu>, as soon as possible, to make an appointment to discuss your special needs and to obtain an accommodations letter. Please also e-mail us as soon as possible with details of how we can better serve you and set up a time to discuss your learning needs.

### Student-Faculty Expectations Agreement

At Georgia Tech we believe that it is important to strive for an atmosphere of mutual respect, acknowledgement, and responsibility between faculty members and the student body. See <http://www.catalog.gatech.edu/rules/22> for an articulation of some basic expectations that you can have of me and that I have of you. In the end, simple respect for knowledge, hard work, and cordial interactions will help build the environment we seek. Therefore, we encourage you to remain committed to the ideals of Georgia Tech while in this class.

### Statement of Intent for Inclusivity

As members of the Georgia Tech community, we are committed to creating a learning environment in which all our students feel safe and included. Because we are individuals with varying needs, we are

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reliant on your feedback to achieve this goal. To that end, we invite you to enter into dialogue with us about the things we can stop, start, and continue doing to make the classroom an environment in which every student feels valued and can engage actively in our learning community.

### **Honor Code and AI Use**

Many deliverables in this course are team-based, and you must work together with your team members to complete this work. You may also talk with anyone else enrolled in the course about specific questions; however, when composing, you may not work with students outside of your team or use other tools like generative AI. Plagiarism of any form will not be tolerated as it is a violation of the GT Academic Honor Code.

We want you to learn to write technical communication; we do not want to read AI generated text, data, or figures, which is boring and will be considered plagiarism. Unauthorized use of any previous semester coursework is prohibited in this course — this includes GT 'word' and generated text that has been previously used because of past AI use.

Having said that, we recognize that AI and in particular generative AI is transforming all aspects of biomedical engineering and want to encourage teams to use AI responsibly. All assignments will require an attestation where each **individual** will need to clearly state how they leveraged AI in the preparation of the deliverable. In the attestation, if you used generative AI, include a note that you are giving away copyright of your created work for all users to use, modify and distribute the work without the need to give it credit.

All written assignments must be generated in a digital document stored in your MS Teams folder that allows the review of every change made by each team member. There also has to be traceability in all forms, not just written reports. This includes raw data, processed data, and tools used to create the work. The attestation should include accessible links to the locations where these items are located.

**Deliverables without this completed attestation will not be graded and considered to be a late assignment.**

All written documents will also be analyzed by an AI/plagiarism checker. You will have immediate access to the report when you submit your assignment. Please carefully review this before submission any suspected instance of dishonesty will be reported to the office of student integrity. If you have any questions about the appropriate use of AI please ask your TA and/or Instructor prior to submission.

Using materials without attestation will be considered a direct violation of academic policy and will be dealt with according to the GT Academic Honor Code. Each violation of the honor code will be immediately and without question reported to the Office of Student Integrity and will result in a minimum of a lower letter grade or a zero on the assignment, whichever is higher. For team-based assignments, your team will be referred to the Office of Integrity.

### **Agenda**

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The Assignments tab in canvas contains all course-related due dates. You can find specific information about each graded assignment within Canvas including grading rubrics. Pay special attention to the team notebook checkpoints on Canvas — for readability and concision, they are not listed below.

**Table 2. List of dates, modules, and what the in-lab time will be spent working on. Subject to change**

Date	Day	Module	Lab
Week of 5/18	1	Team Formation	Lab expectations and team formation
		Module 1: Heart Rate Variability	<b>Deliverable: Modified ChatGPT Protocol for ECG characterization</b> Test ECG Circuit
	2	Module 1: Heart Rate Variability Module 2: Literature Searching EMG (Journal Club (JC))	Collect and upload ECG Data (run Modified ChatGPT Protocol) Select and digest Journal Club articles
Week of 5/25	1	Module 1: Heart Rate Variability	<b>Deliverable: Heart Rate Variability (HRV) Figure (Module 1 completion)</b>
		Module 2: Literature Searching EMG (Journal Club (JC))	In-class peer feedback, Work on JC presentation <b>Deliverable: Journal Club Presentations &amp; Peer reviews (in class) (Module 2 completion)</b>
	2 (Dr. Peak Absent)	Module 3: EMG Physiology & Experimental Design (Project Proposal)	Experimental Design: Formative feedback on proposal including statistics and figures <b>Deliverable: Human Subjects/Compliance Quiz</b>
Week of 6/1	1	Module 3: EMG Physiology & Experimental Design (Project Proposal)	<b>Deliverable: Pre-Lab Proposal Presentations and peer reviews (Module 3 completion)</b> Reflect on feedback and improve proposal Test circuit/design on your team
	2	Module 4: Project Realization	Open Lab: Gather data
Week of 6/8	1	Module 4: Project	Open Lab: Gather data
	2	Realization	Open Lab: Figure 1 due by end of class on 6/11
Week of 6/15	1	Module 4: Project	Open Lab: Gather data
	2	Realization	Open Lab: Figure 2 due by end of class on 6/18
Day of 6/23	1	Module 4: Project Realization	<b>Poster presentation and peer review (in class)</b> <b>Report &amp; Reflection (Module 4 completion)</b>

**Async lecture quizzes will be given weekly on Thursdays.**

### Campus Resources for Students

In your time at Georgia Tech, you may find yourself in need of support. Below you will find some resources to support you both as a student and as a person.

Communication Center: (<http://www.communicationcenter.gatech.edu>)

The Office of the Dean of Students: <http://studentlife.gatech.edu/content/services>; 404-894-6367;

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Counseling Center: <http://counseling.gatech.edu>; 404-894-2575;

Students' Temporary Assistance and Resources (STAR): <http://studentlife.gatech.edu/content/need-help>

Can assist with interview clothing, food, and housing needs.

Stamps Health Services: <https://health.gatech.edu>; 404-894-1420

OMED: Educational Services: <http://www.omed.gatech.edu>

Women's Resource Center: <http://www.womenscenter.gatech.edu>; 404-385-0230

LGBTQIA Resource Center: <http://lgbtqia.gatech.edu/>; 404-385-2679

Veteran's Resource Center: <http://veterans.gatech.edu/>; 404-385-2067