Quantitative Engineering Physiology II (BMED 3610) Fall 2026

Course Summary: BMED 3610 is a senior undergraduate required course for BME students. This lab course allows the undergraduates to gain experience in engineering strategies for biomedical problems. Students working in teams propose strategies for intervention and conduct hands-on experimentation to validate their approach.

Prerequisites or co-requisites: BMED 3600(prerequisite w/concurrency) and BMED 2400 (or CEE/ISYE 3770)

Syllabus

Course Objectives

To reinforce selected engineering principles of physiology in a hands-on active learning team environment. The specific objectives of the lab include:

- **Experimental Approach:** To test concepts in physiology that are learned in a classroom setting using appropriate experimental strategies to generate quantitative data and conclusions.

- **Techniques and Technologies:** Learn necessary technical skills required for the experimental approach including use of appropriate instruments to make relevant measurements. Understand fundamentals that will allow use of instrumentation for other applications and limitations.

- **Data Analysis:** Apply principles of statistical experimental testing and design to implement a coherent series of measurements to allow quantitative analysis. This will form the basis for determining the significance of the findings from the study.

- **Critical Evaluation of Strategies and Outcomes:** At all stages of the experimentation, critical analysis should be applied to determine merits and shortcomings including use of instrumentation, experimental design, controls, materials, and procedures. This would allow for redesigning of an experiment(s) to overcome any shortcomings.

- **Communication:** Both oral presentation and written communication of research strategies and peer-reviewed literature including weekly progress reports and lab reports.

- **Teamwork**: Work constructively in a team environment. Maintain an effective work plan to meet milestones/timelines.

At the end of the course, students will:

1. Develop the ability to read and apply knowledge gained from scientific literature.
2. Design/engineer strategies to tackle biomedical problems using mammalian cell cultures.
3. Develop the ability to quantitatively measure, statistically analyze, and interpret experimental data from cell systems.

4. Complete a team-based experimental design project that will culminate in a poster presentation.

BME3610 is one of several courses in our curriculum that focuses on developing students' **entrepreneurial mindset (EM).** When faculty talk about 'EM' they do not just mean starting a company. Instead, when people in BME say EM, we want students to do three things we call 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.

While this can happen in ANY course, this course presents opportunities to develop your EM. You will likely find the 3Cs most obvious identifying an opportunity and proposing hands-on experiments in the biomedical engineering field as a team.

You may also notice a focus on stories in these EM courses. As you move through the process in this course, you will have many experiences that employ your EM in ways that could become a good story – including identifying an opportunity, proposing a valuable experiment, or even reflecting on your results. These 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 graduate school admissions, or take whatever your next step is. We have a class at the end of the BME curriculum, BMED 4000, where we help you develop those stories to make them impactful both on your sense of yourself and how others understand you.

E-mail Etiquette and Appointments

You can email me to discuss any course related matters. Please email to schedule an appointment. Virtual meetings can also be set up via MS Teams. In-person office hour timings will be announced via Canvas.

Grading

Breakdown of grade based on 100 points.

15 Points: Individual work notebook (online)
10 Points: Module 1: Journal Club Presentation (individual)
10 Points: Module 2: Module 2 report (group)
5 Points: Quiz
10 Points: Module 3: Research Proposal report (group)
15 Points: Module 4: Final project report (individual)
15 Points: Module 4: Poster presentation(final)
10 Points: Proposal Presentation
10 Points: Team evaluations (individual)

The following are the grade cutoffs for this class:

≥ 90% = A	≥ 80% = B	≥ 70% = C	≥ 60% = D	< 60% = F

Modules are described in the BMED 3610 Lab Handbook. If you do not understand what is being asked of you from a final deliverable POV, it is your job to clarify. Grading rubrics are part of this lab handbook. Make sure to read them before submitting any deliverables.

Lab deliverables will be due according to the course timeline. Late deliverables other than notebooks and demos will receive a 10% per day penalty. Grading questions and concerns should be brought to the attention of the TA no later than one week after the graded assignment is uploaded to your folder by your TA.

Teamwork

Teamwork is an essential part of this course, where most deliverables are team based.

Peer/Self-Assessment Survey

After each team-based module, you will fill out and submit a Peer/Self-Assessment Form as a confidential way of letting your TA and Instructor of any issues or outstanding performers within your team. The 10 grade points assigned to these evaluations are NOT based on the scores given to or received from another student, but on the quality and submission of the evaluations.

Reporting Team Issues

Any issue that arises in your team must be emailed to your TA and faculty no later than one week after the due date of the deliverables for the lab.

Honor Code

There are both team and individual deliverables in this course. You must work together with your team members to complete module deliverables.You may also talk with anyone else enrolled in the course about specific questions; but, when writing individual reports, you may not work with other students. Plagiarism of any form will not be tolerated as it is a violation of the GT Academic Honor Code.

Unauthorized use of any previous semester coursework in your report is prohibited in this course. Using these materials will be considered a direct violation of academic policy and will be dealt with according to the GT Academic Honor Code.

Special accommodations

Students needing special accommodations need to contact the Office of Disability Services (ODS). Every effort will be made so that the learning objectives are accomplished.

AI Policy

Student teams are encouraged to use AI tools to propose research projects to

facilitate anticancer drug discovery.

Mental Health Resources

Your instructors, and the BME department as a whole, care about student mental health. While your instructors can be a resource, we also want to make sure you are aware of the formal resources for receiving mental health assistance in BME and at GT. More information about these resources can be found here: https://mentalhealth.gatech.edu/

- **Mental Health Care & Resources** – The Center for Mental Health Care and Resources (CMHCR) is the best place to engage with mental health care at GT. They are found in the Smithgall Student Services Building and can also be reached at **404-894-2575**. Their normal hours of operation are 8am to 5pm Monday through Friday. CMHCR can connect you with services including individual or group counseling, academic or personal support services, assessment and testing for learning disabilities, and other mental health providers. They can help you find the right resources for a crisis, an acute issue, or a longer-term concern.
- **BME Satellite Counselor** – In addition to the Center for Mental Health Care's centralized services, BME hosts a counselor, Kate Silverio, in Room 1105 of the Whitaker Building (in the back of the academic office). The Satellite Counselor offers 15 min appointments (in-person or virtual) during which students can discuss a brief or specific, non-emergency concern, and/or learn about mental health resources on campus. To schedule with the Satellite Counselor, please email her (**kate.silverio@studentlife.gatech.edu**).
- **Crisis Services -** If you require immediate support for mental health difficulties you have several options:
  During business hours (8 a.m.-5 p.m.). Call **404-894-2575** or go to Suite 238 in the Smithgall Student Services Building.
  Outside of business hours, call **404-894-2575** and select the option for the after-hours counselor.
  In an emergency, call Georgia Tech Campus Police at **404-894-2500** on campus or **911**.

Personnel

Faculty: **Dr. S. Balakrishna Pai-** balakrishna.pai@bme.gatech.edu **; Office: Whitaker 3122**

Lab Coordinator/ TA: **Ketki Patil** - kpatil7@mail.gatech.edu**; Office: Whitaker 0239**

Lecture: Day/Time: TBD, Location: TBD.

Lab Sessions: Whitaker Rm.0245.

Section	TA	Day	Start time	End Time	Email Address
A01	Jicheng You	Tuesday	800	1045	jyou75@gatech.edu
A02	Vani Sridhar	Tuesday	1230	1515	vsridhar40@gatech.edu
A03	Miguel Flores Garcia	Wednesday	1230	1515	mgarcia340@gatech.edu
A04	Anton Simieou	Thursday	800	1045	asimieou@gatech.edu
A05	Claire Su	Thursday	1230	1515	csu70@gatech.edu
A06	Elizabeth Nelson	Friday	800	1045	enelson67@gatech.edu
A07	Jiahui Mao	Wednesday	800	1045	jmao81@gatech.edu