

BMED 4753 Syllabus

Frontiers in Neuroengineering BMED 4753, Section 1, 3.0 Credits

Fall 2026

Instructor Information

Instructor: Dr. Annabelle Singer

Email: asinger@gatech.edu

General Course Information

Description

This is an upper-division, undergraduate or graduate level course in BME that trains students on important principles in neuroengineering related to measurement and manipulation of the nervous system. Using a problem-based learning approach, students will learn to evaluate and develop neurotechnologies for basic science discovery and for diagnosis and treatment of disease.

Course Learning Outcomes

- Identify key aspects of the nervous systems that can be the basis for measurement and intervention
- Understand what aspects of the biology are relevant to a particular neurotechnology
- Apply appropriate measurement or manipulation scale to achieve biological goal
- Analyze existing neurotechnologies
- Design novel neurotechnology
- Generate insightful questions and critiques of neurotechnology
- Hone self-directed inquiry, critical thinking skills, and creative collaboration skills

Required Course Materials

Required reading materials will be provided.

Grading Policy:

Phase I Executive Summary (9%), Phase II Presentation (9%), Phase III Presentation (9%), Paper Discussions (8%), Final Report (9%), Homework Assignments (8%), Research Log

(25%), Peer and Self-Evaluation (5%), Class participation (9%), Evaluating Commercial Neurotech (9%). Rubrics will be provided in advance for presentations and reports

Final letter grades are as follows: A: 90-100%; B: 80-89.9%; C: 70-79.9%; D: 60-69.9%, F: below 60%

Assignments

- Phase I Executive Summary, 9%
- Phase II Presentation, 9%
- Phase III Presentation, 9%
- Paper Discussions, 8%
- Final Abstract and Figures, 9%
- Homework Assignments, 8%
- Research Log, 25%
- Peer and Self-Evaluation, 5%
- Class participation, 9%
- Evaluating Commercial Neurotech, 9%

Description of Graded Components

- **Paper discussions**
 - Each group will lead two paper discussions. Presenters will be graded both on the mastery of the material they present and their ability to engage the rest of the class in discussion throughout the presentation.
 - Other groups are required to read and critique papers and participate in the discussion. This will count towards participation.
 - The night before each paper presentations, 3 questions about each paper are due in Canvas
- **Group Projects including Phase I Executive Summary, Phase II and III Presentations, and Final Abstract and Figures**
 - In groups, students will design and evaluate novel neurotechnologies based on a problem statement inspired by current frontiers in neuroengineering. Students will present their projects in class, receive feedback, and write up a report about their proposed designs and experimental validation and testing. Groups will be assigned by the professor. Assignments will not be accepted after the deadline.
 - **Phase I Executive Summary**

- An explanation of the group's problem definition including a written portion and illustrations will be due at the end of Phase I. The summary will be graded using instructor evaluations based on a summary rubric.
- **Phase II and III Presentations**
 - Groups will present their progress in 2 presentations. Presentations will be graded using instructor evaluations based on a presentation rubric.
- **Final Abstract and Figures**
 - Final Abstract and Figures will be graded using instructor evaluations based on a report rubric.
 - The final abstract and figures will be due during the final exam period uploaded to Canvas. No late reports will be accepted.
- **Research Logs**
 - Each student will keep and maintain a research log, in the form of an electronic document. This is completed by each individual student (not the group).
 - Logs should be continually updated
 - Logs will be periodically checked – you will be asked to turn this in periodically during the semester, with 24 hours' notice – it is important that you keep up with this
 - Late research logs will receive ½ credit
- **Homework Assignments**
 - The night before each paper presentations, 3 questions about the paper are due in Canvas. These are completed by each individual student. These questions facilitate paper discussion.
 - Late assignments will receive ½ credit.
- **Commercial Neurotechnology Evaluation**
 - In a written report, students will identify an existing neurotechnology, explain how the technology works and critically evaluate the strengths and weaknesses of the evidence that it is efficacious

- **Peer and Self Evaluation**

- All students will rate themselves and each member of their group in terms of their critical assessment, creative contributions, and collaboration via a survey.

- **Class Participation**

- Class participation includes activities during lecture (like drawings of concepts), questions and comments during paper discussions, and questions and critiques of other groups' presentations.
- Students often silence themselves because they think that their question is trivial and they should know the answer. I assure you, someone else has the same question. There are no "dumb" questions, and it is ok to be wrong.
- Lack of preparedness, failure to work cooperatively, absences, and tardiness will lower your participation grade

Course Policies

Attendance and/or Participation

- Attendance and participation are required but excused if you are sick. Please stay home if you are symptomatic or COVID+.
- Students requesting an excused absence must submit documentation 2 weeks in advance or within 24 hours of the missed class.
- Approval of excuses are subject to the instructor's discretion. Examples of non-excusable absences include scheduling a doctor's appointment or other meeting, going on vacation, oversleeping, traffic.
- If you experience a personal emergency or extended illness, contact your instructor and the Office of the Vice President and Dean of Students to obtain documentation.
- If you are participating in approved Institute activities, contact the Student Academic and Financial Affairs Committee of the Academic Senate at least two (2) weeks prior to the event to obtain documentation. Documentation associated with preapproved Institute activities such as Athletic events should be provided

- Research commitments are not valid excuses for missing class. Presentations at scientific meetings are considered Institute approved activities with an email from your research advisor/supervisor and the conference program.
- Career fairs are an acceptable excuse for missing class (with instructor notification), but you must make up the material you miss.

Academic Integrity

Georgia Tech aims to cultivate a community based on trust, academic integrity, and honor. Students are expected to act according to the highest ethical standards. Review [Georgia Tech's Honor Code](#) and the student [Code of Conduct](#).

Any student suspected of cheating or plagiarism on a quiz, exam, or assignment will be reported to the Office of Student Integrity, who will investigate the incident and identify the appropriate penalty for violations.

Core IMPACTS

[Core IMPACTS](#) is the University System of Georgia's General Education curriculum. If you are teaching a course that counts towards Core IMPACTS, you should include a syllabus statement about the Core area and associated [career competencies](#). [This resource](#) developed by the Center for Excellence in Teaching and Learning and Online Education at Georgia State University includes template syllabus statements for each of the Core IMPACTS areas that you may adapt for your course.

Accommodations for Students with Disabilities

If you are a student with learning needs that require special accommodation, [contact the Office of Disability Services](#) (404-894-2563) as soon as possible to make an appointment to discuss your special needs and to obtain an accommodations letter. Please also e-mail me as soon as possible in order to 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. [The Student-Faculty Expectations](#) articulate 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, I encourage you to remain committed to the ideals of Georgia Tech while in this class.

Pre- &/or Co-Requisites

- Statistics from one of the following courses or equivalent experience: BMED 2400, ISYE 3770, PSYC2020, BIOS4401, MATH3225, MATH 3215, MATH 3670
- Neuroscience fundamentals from one of the following courses or equivalent experience: BMED 3100, NEUR 2001, BIOS 3755
- Note equivalent experience to any of the above is acceptable, please reach out to the instructor if you are unsure about whether you meet the pre-requisites.

Use of Generative AI

ChatGPT and AI-based assistants are powerful tools that have strengths and weaknesses. You may use these as study tools, however all work you submit must be your own. You should never include in your assignments anything that was not written directly by you without proper citation (including quotation marks and in-line citation for direct quotes). Including anything you did not write in your assignment without proper citation will be treated as an academic misconduct case. If you are unsure where the line is between collaborating with AI and copying AI, we recommend the following heuristics:

- Heuristic 1: Never hit “Copy” within your conversation with an AI assistant. You can copy your own work into your own conversation, but do not copy anything from the conversation back into your assignment. Instead, use your interaction with the AI assistant as a learning experience, then let your assignment reflect your improved understanding.
- Heuristic 2: Do not have your assignment and the AI agent open at the same time. Similar to the above, use your conversation with the AI as a learning experience, then close the interaction down, open your assignment, and let your assignment reflect your revised knowledge. This heuristic includes avoiding using AI directly integrated into your composition environment.
- Heuristic 3: Understand the pros and cons of the tools you are using. As a user it is your responsibility to research and understand how and when these tools lead to incorrect or poor-quality answers and when they interfere with rather than help your depth of understanding.
- Heuristic 4: Check that any information you receive from AI-tools is supported by peer-reviewed sources.

Late Assignments and Make-up Policies

- Homework, Commercial Neurotech Evaluation, and Research Log: Late assignments will receive ½ credit.

- Presentations: There will be no make-up presentations. Other members of your group may take your place if you are sick. You are encouraged to have back-up presenters prepared in case of illness.
- Final Papers: There will be no make-up final papers, nor will papers be accepted after the date and time when they are due. You are encouraged to have papers done in advance in case of illness.
- Lecture: If you miss a lecture, it is up to you to find out from your classmates and Canvas (e.g. posted slides) about material that you missed. You can make up class participation by participating more in other class sessions.

Inclement Weather and Digital Learning Days

In case of inclement weather that closes campus, look for an announcement on canvas on how class will be conducted.

Communication and course materials

- The syllabus, assignments, readings, lecture slides, and relevant course materials will be posted on Canvas. Course materials may appear prior to or following the lecture and will typically be posted within 24 hours of the class.
- Assignments will be submitted through Canvas.
- Important class announcements will be announced through Canvas. It is your responsibility to check Canvas regularly for these updates. All email correspondence will be with your Georgia Tech student email address.
- To email instructors, use “BMED 4753: *****” as subject line, replacing ***** with topic of email. For group questions, have one member of the group email the instructor to avoid duplicate emails on the same topic. Emails not following this format may not be read.

Campus Resources for Students

Undergraduate Student Academic Success Resources:

- Academic Support: Academic Success and Advising (a unit in the Office of Undergraduate Education & Student Success) provides free support for your courses. Students can attend scheduled supplemental review (PLUS) sessions,

stop by Drop-In Tutoring, or schedule a one-on-one appointment through Knack. To explore what options work best for you, please visit us online at success.gatech.edu/tutoring, email us at tutoring@gatech.edu, or come see us at Clough Undergraduate Learning Commons, Suite 283.

Graduate Student Academic and Professional Success Resources:

A list of resources for graduate students is given on the [Office of Graduate and Postdoctoral Education](#) website. Specific information for [current graduate students](#) includes

- [Academic Resources](#) such as the Communications Center, Language Institute, Library, Catalog, Registrar, resources for conducting research, Advocacy and Conflict Resolution resources, and how to manage unexpected situations that may impact your academic performance;
- [Student Resources](#) such as Campus Services, Child Care/Family programs, Health & Wellness, Career Services, and the Student Resource Guide; and
- [Professional Development](#) such as the programming from the Career Center and other professional development resources and events”

Student Well-Being:

At Georgia Tech, we are concerned about your overall physical, social, and mental well-being. A [comprehensive list](#) of wellness related resources has been compiled and maintained by the Office of the Vice President for Student Engagement and Well-being ([student-resource-guide \(gatech.edu\)](#)). If you are experiencing unmanageable stress or a personal crisis, please reach out to a counselor, your academic advisor, a professor, a faith leader, a parent, or a friend. If you are unable to complete your coursework, work with your academic advisor to make accommodations.