BMED 7601 - Advanced Seminar: Neuroengineering Approaches to Neuropathology
Class time and location TBA

Instructor:
Prof. Bilal Haider
bilal.haider@bme.gatech.edu
Office hours: by appointment (UAW 3104 or online as needed)

Format:
All classes will be held in person unless otherwise noted.
All class assignments will use Canvas https://canvas.gatech.edu

Textbooks:
Reading material will be assigned or recommended from foundational and current research papers, with supplemental information from book chapters and/or review articles to provide background or examples of the principles of the course.
Suggested: *The Craft of Scientific Presentations. Critical Steps to Succeed and Critical Errors to Avoid*. Second Edition. By Michael Alley. Springer 2013 (posted in Canvas Files)

Prerequisites:
Second year graduate student or instructor permission. It is expected that students will already have graduate level coursework in both neuroscience and engineering.

Purpose:
This course focuses on neuroengineering approaches to understand nervous system function in order to treat neuropathology through advanced neuromodulation.

The content of the course is intended to promote critical thinking about neuroengineering principles and technologies through review of both foundational and "state-of-the-art" studies. This will involve 1) integrating across engineering, neuroscience, and clinical domains, and 2) integrating concepts from course content throughout the semester.

Practicing deep analysis, discussion, and presentation of primary literature helps students identify and consider limitations in our knowledge of nervous system function, dysfunction, and neuromodulation technologies and strategies. Critical thinking skills developed in this course will improve the quality of student research and will apply to many career paths.

Objectives:
Key learning objectives of this course are:

1. Examine complex scientific issues in neuroengineering and neuropathology spanning a wide variety of domains and systems
2. Critically read and critique primary literature to hone active thinking and communication skills
3. Design and deliver effective scientific presentations that foster engaging discussions

Topics:
Two modules frame key topics for understanding and advancing neural system stimulation and functional recovery:

1. Neural coding
2. Neuromodulation

Throughout both modules, students will learn fundamentals about sensory, motor, and memory functions in the nervous system, and survey current approaches for directly interacting with and modulating these systems with a variety of neurotechnologies.

Principles:
We strive to maintain openness, respect, equity, and inclusion in the classroom for all students. Students are expected to contribute to collective learning while making sure all voices are heard. We will make classroom accommodations for students with documented disabilities, arranged in advance and in accordance with the Office of Disability Services. (https://disabilityservices.gatech.edu).

Grading:

Journal Article Review (JAR; includes preliminary and final)	400 points
Peer-review of Presentations (20 pts each x 15)	300 points
Seminar Summaries (50 pts each x 2)	100 points
Participation	200 points
TOTAL	**1000 points**

JAR: Students will be required to present a summary of one journal article during the semester. The presenter will be evaluated on verbal and visual clarity, presentation skills, and ability to lead and facilitate a critical discussion of the main findings of the paper and their relationship to the themes of the course. Preliminary slides and written summary will be reviewed by the instructor prior to the in-class presentation. See JAR Presenter rubric on the course web site for details of evaluation criteria.

Peer-review: Every student (besides the presenter) is expected to submit a critique of JAR within 48 hours of the presentation. Each student is required to submit a minimum of 15 JAR peer-reviews during the semester. If more than 15 are submitted, the 15 highest grades will be counted. See JAR Peer-review rubric on the course website for specific details.

Seminar summaries: Students will attend two GT Neuro seminars (or equivalents) related to the themes of the course in order to gain exposure to cutting-edge research and to consider and evaluate the effectiveness of different speaking and presentations styles. See Seminar Summary rubric on the course website for details.

Participation: Participation will be determined by class attendance and the number and quality of contributions to group discussions (such as by asking relevant and critical questions about assigned articles, clarifying debated points, or fostering alternate viewpoints).

Attendance: *Excused absences.* Academic conflicts (such as conference attendance, or similar professional obligations) should be discussed with the Instructor ASAP, and no later than 2 weeks before a scheduled absence. Short-notice excused absences will be handled case-by-case at the instructor's discretion, and require at least 48h notice.
Unexcused absences. Each student can miss a maximum of two classes without consequence (no permission required). All subsequent absences will result in a minimum decrease of one letter grade for each incidence**.**
Lateness. Each student can arrive late (<15 mins) for up to 2 classes with no consequence. All subsequent late arrivals (<15mins) will result in 10% off the final grade for each instance. Any instance of lateness (>15 mins) counts as an absence.

Late grading: Assignments will have clear due dates and times posted in Canvas. One assignment may be submitted late with no penalty. More than 1 late assignment will result in 10% reduction of grade per assignment (up to 3), then overall reduction of a full letter grade for each additional late assignment.

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; https://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 me as soon as possible in order to set up a time to discuss your learning needs.

Honor Code Academic dishonesty will not be tolerated. This includes cheating, plagiarism, lying about course matters, attendance, or helping others commit a violation of the Honor Code. A student suspected of academic misconduct will be reported to the Office of the Dean of Students. Plagiarism includes reproducing the words of others (including AI; see below) without both the use of quotation marks and relevant scholarly citation. Students are reminded of the obligations and expectations associated with the Georgia Tech Academic Honor Code and Student Code of Conduct, available online at https://policylibrary.gatech.edu/student-life/academic-honor-code

Student-Faculty Expectations 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

Agreement: body. The Student-Faculty Expectations guide (https://catalog.gatech.edu/rules/21/) articulates 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 learning environment we seek. Therefore, I encourage you to remain committed to the ideals of Georgia Tech while in this class.

AI policy: Please carefully review the most up to date GT Official Guidance on AI use: https://oit.gatech.edu/ai/guidance
We strongly encourage all students to maximize learning and achieve course objectives without dependence on AI-based tools. *The depth and quality of your learning is directly related to the depth and quality of your direct, unfiltered reading of source material, and the self-generated effort of decision making and problem solving.* AI tools can be helpful learning aides; it is also well known that they provide impoverished, biased, and often inaccurate or entirely fabricated content. However, we do recognize that students may want to use AI tools effectively for refining understanding or improving their self-generated products, or using AI as a "tutor" to clarify concepts from source reading. These are permissible use cases, provided that the student discloses their usage in the assignment, and documents all details related to their usage (e.g. saves prompts, outputs, draft documents, conversation history, revision history). AI-based tools are not permissible for the following activities and learning objectives: generating the ideas and their organization for your presentations; replacing your own review of primary literature; drafting your own writing; conducting evaluations of your peers; critiquing a seminar; creating and sequencing your presentations. Much of your learning happens in the construction, iteration, refinement of your own ideas, and by clarifying your path of logic through your own thinking. This is not "wasted" time – this is the very activity that imprints your learning. If you are unsure whether your intended use of AI falls within acceptable use cases permitted by the course, consult the instructors. Instructors have the right to revise the acceptable and unacceptable use policy during the semester as needed. Inappropriate use of AI, or failure to disclose/document use of AI tools for permitted uses, or suspected uses, is considered a violation of the course policy on academic integrity (see above).

UNANTICIPATED CHANGES TO COURSE SCHEDULE, DEADLINES, OR POLICIES WILL BE COMMUNICATED PROMPTLY IN CANVAS PER INSTRUCTOR