Fall 2026 – NEUR 3001 Syllabus
Neuro-Cell & Molecular

I. COURSE OVERVIEW

Lecture (3 credits): MW 3:30 – 4:45 pm (in-person course delivery)

Course Description:

This course provides students with a foundational understanding of molecular and cellular neuroscience. Molecular and cellular neuroscience is the study of neuroscience within the microscopic lens, seeking to understand and explain complex behaviors via the integrated actions of proteins, cellular structures, and individual neuron/glial cells. In this course, students will gain (1) knowledge related to cellular and molecular neurological processes, (2) confidence in reading and analyzing scientific papers, and (3) enhanced critical thinking skills. In this course, we seek to answer questions such as: How do neurons precisely translate (encode) external stimuli into electrical impulses? How do graded and action potentials form, propagate, and sum to contain information? How does myelination speed up action potentials, and thus damage to myelination cause disease? How do individual cations and anions produce a current that alters the voltage stored across the membrane of the neuron? How do specific proteins regulate the membrane potential of a neuron? Etc. Students will apply their knowledge in independent and collaborative formats.
PreReq: *Neur 2010 or 2000 minimum grade of C*

Course Goals / Learning Outcomes –

Together in this course, we will learn to:

- Recognize key neurotransmitters, receptors, and intracellular signaling pathways
- Explain how ion channel properties and electrochemical driving force determine the direction and magnitude of ionic currents across neuronal membranes.
- Compare and contrast how neurons and glia function in the nervous system
- Explain the molecular and cellular basis of techniques such as immunostaining, calcium imaging, Cre-Lox, and patch-clamp electrophysiology.
- Apply equivalent circuit models to analyze neuronal membrane electrical behavior.
- Analyze passive membrane properties and predict their effects on neuronal signaling.
- Examine how the nervous system wires during development and within neuroinflammation states
- Design experiments to evaluate sensory system function
- Analyze how molecular, cellular, and genetic defects lead to neurological diseases
- Display confidence and competency in reading and critically analyzing scientific papers
- Effectively collaborate with peers

Textbook/Materials:

All course assignments, readings, and grades will be posted/submitted via Canvas. ***You will need to bring some sort of electronic device with access to the internet, paper, and a pencil to class each day.***

II. COURSE GRADING

CATEGORY	ASSIGNMENT	POINTS
Demonstrating Knowledge (55 %)	**Exam 1 -15%**	**150 pts**
	Exam 2 – 15%	**150 pts**
	Exam 3 - 25%	**250 pts**
Literature Project (25%)	**Individual Scientific Literature Practice**– 90 pts **Group Case Studies** – 160 pts	**250 pts**
Engagement (20%)	**Perusall Readings (PCAs) – 50 pts** **Homework – 100 pts** **Practice Quizzes – 30 pts** **Pre & Post Test – 20 pts**	**200 pts**
Bonus (2%)	**Mid-Semester & CIOS Evaluations**	**10 pts**
	Midterm & Final Reflections	**10 pts**
	Total: 1000 pts + 20 bonus pts	

Grading Scale:

Your final grade will be assigned as a letter grade according to the following scale:

A	90 – 100 %	900.0+ pts
B	80 – 89.99 %	800.0 – 899.9 pts
C	70 – 79.99 %	700.0 – 799.9 pts
D	60 – 69.99 %	600.0 – 699.9 pts
F	0 – 59.99 %	< 600.0 pts

III. COURSE EXPECTATIONS & GUIDELINES

Academic Honesty/Integrity

Students are expected to maintain the highest standards of academic integrity. All work submitted must be original and properly cited. Plagiarism, cheating, or any form of academic dishonesty (including use of Artificial Intelligence where not permitted or working with others on individual assignments) will result in immediate consequences as outlined in the university's academic honor code: https://policylibrary.gatech.edu/student-life/academic-honor-code

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Accommodations for Students with Disabilities:

If you are a student with learning needs that require special accommodations, contact the Office of Disability Services (http://disabilityservices.gatech.edu) as soon as possible to make an appointment to discuss your needs and to obtain an accommodations letter. After you have received your accommodation letter you are welcome to email me to set up a private appointment to discuss how I can best implement these accommodations within the course.

- Please note that exams need to be proctored! It is best to schedule all exams with the testing center if you have the ability to do so.

Statement About Acceptable Student Conduct

To support mutual respect and understanding between students and faculty, Georgia Tech faculty and students collectively adopted a list of student-faculty expectations. See the full Student-Faculty Expectations agreement here: https://catalog.gatech.edu/rules/22/

- Grading/assignment/peer-review/evaluation disputes must be made no later than 7 days from the date the grade/assignment was returned.

Extensions & Late Assignments:

Please do not feel pressured to attend class if you experience any symptoms of illness. Your health is personal, and you do not need to inform your instructor or TA about missing class unless you miss an exam day or an in-class literature practicum. In general, all due dates are final without prior (before the due date) instructor approval.

- All Perusall readings are due before the start of class **3:30 p.m. on Perusall** and are considered late at 3:31 p.m. All other assignments are due at **11:59 p.m. on Canvas** and are considered late at 12:00 a.m. the next day. Because students are given multiple days, if not weeks, to complete these assignments, all late work will be subject to a 10% grade reduction for every 24 hours it is late.
    - Note: multiple submissions are accepted. Please don't wait until the last hour to submit.
    - Corrupted/unreadable assignments that cannot be opened will receive a 10% late penalty.
    - If you have extenuating circumstances/ODS accommodations that are documented, I'm more than happy to extend due dates on individual assignments to help accommodate you, but you must seek prior approval/contact me before the due date if it is possible to do so!

- **Exams:** makeup exams must be scheduled within 7 days of the original exam unless you have a letter from the Dean of Students excusing you for an extended period of time. Scheduling a makeup exam is the student's responsibility. The instructor has the right to give makeup exams in an alternative format, including in-person oral exams or all-essay exams. Exams missed without prior approval receive a zero unless there are extreme extenuating circumstances.
    - Note: students may not take any exam if they are more than 45 minutes late.

Attendance

Students are highly encouraged to attend class in person to the greatest extent possible, as course attendance correlates with higher achievement/performance on exams. However, the only day when your attendance is required is during examinations and the literature case study practicums. If you are absent on any other day, it is your responsibility to make up all material covered in your absence and/or attend office hours to learn the materials that you missed, BUT no documentation is necessary. Note: Zoom recordings will not be available. To avoid distractions, the instructor may choose to limit late entry into the classroom beyond the first 15-20 minutes.

If you need to miss an exam/literature case study practicum you are responsible for (1) informing the instructor at the earliest possible convenience (see regulations below), (2)

providing some sort of documentation for your absence, and (3) scheduling makeup exams within 7 days of the original exam (unless given approval by the Dean of Students to delay).

Excused absences that require 14+ day prior approval/scheduling include approved institute activities* (such as field trips, professional conferences, and athletic events), voting/jury duty*, participation in religious observances, pre-planned surgeries/medical visits*, and known professional activities if you have a career outside of being a student*.

Excused absences that require day-of prior approval/scheduling include sudden personal injury/illness*, death or sudden illness/injury of a family member/friend*, severe weather/institute closure, and other unforeseen and non-preventable special circumstances.

*indicates events that require documentation in the form of a Dean of Students Letter, Athletic Letter, Doctor's Note, etc. You will notice most circumstances require documentation. It is always best to acquire documentation whenever possible. See excused/unexcused absences or visit: http://catalog.gatech.edu/rules/4/

Modified Campus Operations / Digital Learning Days:

In the event of incremental weather or other reasons for campus shutdown, students should expect to move to a virtual class session at the regularly scheduled class time, unless otherwise specified via Canvas Announcement. Depending on the day(s) that campus is closed we may choose to hold class via Zoom or assign an alternative assignment for students to work on (replacing in-class discussion).

V. RESOURCES

Campus Resources:

Georgia Tech offers a wide range of campus resources to help students academically and personally. Click here for a list of relevant resources.

Help With Writing/Presentations:

- The CommLab

When in Doubt Contact:

The Dean of Students Office can connect you with specific resources if you are still unsure of where to go for help. The request assistance form is helpful for sharing documentation from Stamps with your professors among other things.