

REPRESENTATIVE SYLLABUS
CONTENT OF FUTURE COURSES MAY VARY

NEUR 3001

CELL AND MOLECULAR NEUROSCIENCE (3 credit hours)

Instructor - [REDACTED]

E-mail [REDACTED]

Office [REDACTED]

Office hours - [REDACTED]

Class days/time/place – [REDACTED]

Laboratory – [REDACTED]

Required Textbook:

Levitan, Irwin B., and Leonard K. Kaczmarek. The Neuron: Cell & Molecular Biology. 3rd. New York, NY: Oxford University Press, 2001. ISBN: 9780195145236.

Additional sources:

Other books, reviews, and papers indicated in lecture notes and/or posted on T-square. NOTE: Lectures may use outside sources in addition to (or instead of) the textbook.

Grading:

Exams (3 in-class exams and one final exam) – 60%

In class activity, quizzes and assignments (including, but not limited to: questions to lectures and presentations; participation in group discussion; two best quizzes out of 4 surprise quizzes offered in the class (20%); critique of scientific papers in the field (20%).

Prerequisites:

NEUR 2001

Description:

This course provides an overview of major principles and techniques in cell and molecular neuroscience. The topics range from general principles of neuron excitability, synaptic transmission, learning and memory and the basic mechanisms of neurological diseases. Material includes lectures and exams, and involves presentation and discussion of primary literature.

Information will be presented and assimilated through a variety of approaches. Classroom time will be apportioned by approximately 3/4 lecture and 1/4 faculty-facilitated discussions among students divided into groups. Weekly laboratory sessions will enable students to participate in data collection, either real or simulated and in discussions of current literature. Preparation for small group discussions and laboratories will require students to complete reading assignments outside class time.

Excused Absences Policy

In the event of a medical emergency or an illness that is severe enough to require medical attention, students are responsible for contacting the Office of the Dean of Students as soon as possible. Additional details are available online:

<http://www.catalog.gatech.edu/rules/4/>

Learning Objectives:

Upon successful completion of this course, the students should understand:

1. the biological and electrical [why are these different?] properties of neurons and how the nervous system uses electrical signals to transmit information.
2. the mechanisms of synaptic transmission and how synaptic plasticity contribute to learning and memory.
3. how nervous system dysfunction causes neurological and psychiatric disorders.
4. the techniques and experimental approaches [what are the differences?] employed in neuroscience.

Academic Integrity:

Georgia Tech does not tolerate academic dishonesty. This includes cheating, lying about course matters, plagiarism, or helping others commit a violation of the Honor Code. Some exams (when specifically announced in class) allow the use of self-prepared supporting information (one sheet of paper, either typed or handwritten, could be double-sided); no other support materials are allowed at tests. Plagiarism includes reproducing the words of others without both the use of quotation marks and 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 www.honor.gatech.edu.

Learning Accommodations:

If needed, we will make classroom accommodations for students with documented disabilities. These accommodations must be arranged in advance and in accordance with the Office of Disability Services (<http://disabilityservices.gatech.edu/>).

Schedule of Topics:

In class lecture and discussion 3 hours per week

Section 1

- Week 1:** Electrical signaling in the neurons
- Week 2:** Ion channels and Action Potential
- Week 3:** Electrophysiology
- Week 4:** Exam 1 (covers material from weeks 1-3)

Section 2

- Week 5:** How neurons communicate: gap junction and chemical synapses
- Week 6:** Synaptic transmission, presynaptic and postsynaptic mechanisms
- Week 7:** Neurotransmitters, receptors and transduction mechanisms
- Week 8:** Exam 2 (covers material from weeks 5-8)

Section 3

- Week 9:** Neuronal growth, trophic factors and axon pathfinding
- Week 10:** Formation, maintenance and plasticity of chemical synapses
- Week 11:** Sensory receptors
- Week 12:** Neuropharmacology
- Week 13:** Exam 3 (covers material from weeks 9-12)

Section 4

- Week 14:** Neurotechniques I and II
- Week 15:** Learning in aplysia and Drosophila
- Week 16:** Neurodegenerative and neuropsychiatric diseases

Finals Week Exam 4 (covers all course material)