

GMS 6022 Principles of Neuroscience II: Cellular and Molecular Neuroscience (3 credits)

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*Appointments available by request

Course Meetings: T 9:00-12:00AM,

Text Books: (Lecture) **From Neuron to Brain, Fifth Edition** by John G. Nicholls(Author), A. Robert Martin(Author), Paul A. Fuchs
Principles of Neuroscience, Fifth Edition, by Kandel, Schwartz, Jessel, Siegelbaum and Hudspeth
as well as readings assigned by lecturers

Course Description and Objectives: *This semester course provides for integration of molecular and cellular techniques into learning about the fundamental principles of electrical properties and synaptic signaling in excitable cells. Students will gain an understanding of the physiological properties of the components of the nervous system, how ions and ion channels govern the membrane potential and excitability, and how signaling properties arise at the single neuron level to manifest as larger networks that support behavior. Following the function of individual cells, the manner in which they are connected will be covered, including synaptic signaling between neurons. We will cover the molecular make-up of synapses, and different kinds of synapses, the quantal theory of transmission, and neuromodulation. We will also discuss the different kinds of synaptic plasticity mechanisms that make synaptic strength use-dependent. The course includes a review of model systems and neural circuits in integrative neurophysiology, as well as the relation of neural circuits to behavior and cognitive processes.*

By the end of each semester, students will be able to:

- Describe the basic cellular components of neurons and glia
- Describe different types of cellular communication
- Identify the different types of ionic current and describe how that gives rise to resting membrane potential and action potential propagation.
- Describe the properties of synaptic transmission
- Describe contributions of neuronal genetics to phenotypes
- Detail different molecular tools to study neuronal function

Assignment of Grades

Grades will be determined from performance on two exams (1 mid-term exam and 1 final), quizzes, class participation and on a written assignment (student project). Written exams will involve multiple choice, short answer and essay questions.

Point Distribution:

Class Participation: 10%

Quizzes: 10%

Student Project: 10%

Exam I: 35%

Exam II: 35%

ATTENDANCE POLICY: You are expected to attend each lecture and actively participate in the student projects.

QUIZ/EXAM POLICY: There are two exams and four short quizzes in this course. They are in-class exams comprised primarily of multiple choice and short answer questions.

STUDENT PROJECTS: *Each student will write one "Journal Club" on a paper of their choice that published within the last 12 months for 10% of final grade. This will follow the Journal of Neuroscience format (http://www.jneurosci.org/site/misc/ifa_features.xhtml) and should have three components: a short overview of the background of the reviewed paper, a critical data-based review of the key findings, and a brief summary of the significance of a Cellular/Molecular Neuroscience paper. The Journal Club should focus on the most important results (it is not necessary to discuss each figure), and a successful paper will offer a critical evaluation the results in the context of other work. The length should be between 1200 and 1500 words.*

MAKE-UP POLICY: *You are expected to notify the course directors of any anticipated absences. You should make every effort to take the exams on the days they are scheduled. If extenuating circumstances prevent you from taking a scheduled exam, you will need to schedule an appointment to meet with the course directors to identify an alternative exam date.*

Final grades are determined by the scale below. Final grades will be computed on a straight scale (i.e., there is a potential for everyone to receive an A). An exception will be made if after the final grade computations, there are fewer than 15% As. In this instance, all grades will be curved upward so that at least 15% of the students will receive As. Grades will be distributed within one week of each exam and presentation.

Grading Scale:

A ≥ 93% A- 90-92% B+ 87-89% B 83-86% B- 80-82% C+ 77-79 C 73-76%
C- 70-72% D 65-69% E ≤ 64%

All grades assigned in this course will adhere to the UF grading policies that can be found at: <https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>.

Requirements for class attendance, make up exams and other work.

While not explicitly required, **attendance is strongly encouraged**. Slides from classes will be made available online but there is no substitute for the instruction and discussions that will occur in the classes. Students are fully responsible for any content missed due to unexcused absences. Students should meet with the instructors as soon as possible regarding University-excused absences so that accommodations can be made on a case by case basis.

Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies that can be found at: <https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>.

Accommodations for students with disabilities

Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, www.dso.ufl.edu/drc/) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester.

Course Evaluations and Feedback

Students are expected to provide feedback on the quality of instruction in this course by completing online evaluations at <https://evaluations.ufl.edu>. Evaluations are typically open during the last two or three weeks of the semester, but students will be given specific times when they are open. Summary results of these assessments are available to students at <https://evaluations.ufl.edu/results/>.

Academic Honesty

UF students are bound by The Honor Pledge which states, "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment." The Honor Code (<http://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/>) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obliged to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructors in this class.

U Matter, We Care:

If you or a friend is in distress, please contact umatter@ufl.edu or 352-392-1575 so that a team member can reach out to the student.