

BIOL 641-002: Systems Neurobiology

COURSE SCHEDULE:	MW: 1-2:20 pm
INSTRUCTOR:	Farzan Nadim (farzan@njit.edu)
OFFICE HOURS:	MW: 2:20 pm-3 pm or by appointment (email me!)
COURSE WEBSITE:	NJIT Canvas (https://canvas.njit.edu/)

COURSE SUMMARY

This course will examine neurobiological phenomena from the systems perspective. After reviewing the basic concepts of cellular neuroscience such as excitability, impulse conduction, we focus on the integration of activity at the circuit and systems level. The goal is to provide the basic knowledge to understand neurobiological processes at the systems level, and to connect the neural activity with specific sensory, motor and higher functions.

TEXTBOOK

Neuroscience 6th Ed; Purves et al Editors (2017)

LEARNING GOALS

- Describe the cellular structure of the nervous system and the general organization of the central and peripheral nervous system
- Explain the primary neurotransmitter systems in the brain and their receptor types.
- Describe the mechanisms of neural interaction through synaptic transmission
- Describe the principles of sensory transduction
- Describe the principles of motor function
- Understand how neural networks can lead to the production of sensory perception, motor behavior and higher-level functions such as learning and memory
- Describe the development of the nervous system and the basic principles of neural plasticity

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COURSE OUTLINE

- **Synaptic Plasticity**
 - Synaptic Integration / Convergence and Divergence
 - Short- and Long-Term Synaptic Plasticity
- **Functional Organization of the Nervous System**
- **The Development of the Nervous System**
- **Sensory**
 - Touch and Proprioception
 - Pain
 - The Visual System: The Eye / Central Visual Processing
 - The Auditory System: The Ear and Sound Transduction / Central Auditory Processing
 - The Chemical Senses: The Gustatory System / The Olfactory System
- **Motor Systems**
 - Spinal processing / Reflexes / CPGs
 - Upper Motor Systems: Cortical and Thalamic Motor Centers
 - The Basal Ganglia
 - The Cerebellum
- **Cognitive Functions**
 - Cortical States: Sleep and Wakefulness
 - Learning and Memory
 - Sleep

GRADING POLICY AND SCALE

- There are two options for graduate students in this class: either to take exams or to do projects. The default is Option 1 below. Students who want to do Option 2, must inform me by email by Feb 1.
- **Option 1.** The course will have **two midterm exams** and a **non-cumulative final exam** whose date and time will be scheduled by the Registrar. Each of the exams will cover approximately one third of the course.
 - Rules that apply to the exams (specific question types, categories or other rules agreed upon in class) **do not apply to make-up exams** (see important rules and policies below).
- **Option 2** requires no exams; instead it requires three projects. For each project you will choose a scientific (not clinical) topic that is related to this course. The topic must be approved by the instructor. Details for the projects will be provided on Canvas.
 - The first project will be to write a summary of a scientific paper, chosen by the instructor, related to your topic. The grade will be 50% on the summary and 50% on answering questions about the paper.
 - The second project will be to make a recorded presentation of the findings of a scientific paper related to your topic. The instructor must approve the paper. The recording must be accompanied by a summary that describes the findings in your own words. The grade is 40% on the recorded presentation (including the clarity of slides, if those are used), 20% on the summary and 40% on answering questions on the topic.

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- The final project will be similar to the second, in that it includes a recorded presentation and a short paper. However, this project will not focus on a single paper but rather is a summary of findings within this topic. You will be graded primarily on **critical thinking**.
- In addition to the options above, Quizzes will be given on Canvas. There are no make-up quizzes.
- Class participation is part of your grade. This is assessed as three components (4 points each): 1) come to class; 2) be prepared, listen and ask questions; 3) make thoughtful comments when called on.
- Any type of plagiarism will **automatically** result in a grade of zero in that assignment and will be reported to the Dean of Students as a violation of academic rules (see important rules and policies below).

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Assignment	%
Class Participation	12
Quizzes	18
Midterm Exam I	20
Midterm Exam II	20
Final Exam	30
TOTAL	100

Grading Scale	
A	91 - 100
B+	82- 90
B	73 - 81
C+	67-72
C	60-66
F	0 - 59

IMPORTANT RULES AND POLICIES

- ❖ If you test positive for COVID-19, contact your healthcare provider and send notification to covid.notify@njit.edu. If you are sick, DON'T come to class. Email me and let me know.
- ❖ If you miss an exam due to a valid excuse, medical or other, you need to provide valid and verifiable documentation to the [Dean of Students Office](#) and ask them to inform the instructor. Make-up assignments will be determined on a case-by-case basis.
- ❖ Academic Integrity is the cornerstone of higher education and is central to the ideals of this course and the university. Cheating is strictly prohibited and devalues the degree that you are working on. As a member of the NJIT community, it is your responsibility to protect your educational investment by knowing and following the [academic code of integrity policy](#). Please note that it is my professional obligation and responsibility to report any academic misconduct to the Dean of Students Office.

There will be ZERO tolerance for violations of academic integrity. Any student found in violation of the code by cheating, plagiarizing or using any online software inappropriately will result in disciplinary action. This may include a failing grade of F, and/or suspension or dismissal from the university. If you have any questions about the code of Academic Integrity, please contact the [Dean of Students Office](#).