

BIOL 447-HM2: Systems Neurobiology Honors

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)

Use promo code asai2021 to receive 20% off Oxford University Press textbook order at www.oup.com/us/he or by calling (customer service 1-800-445-9714) *

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

GRADING POLICY AND SCALE

- Quizzes will be given on Canvas.
- Class participation is part of your grade. Part of this will be two discussion topics or questions that you will be assigned to talk about, for 5 minutes each, in class.
- You will choose a scientific (not clinical) topic that is related to this course. The topic must be approved by the instructor.
 - Your first two projects will be to make a recorded presentation of the findings of two scientific papers related to your topic. These papers will be assigned by the instructor. The recording has a maximum of 20 minutes. You will get more details on what you need to cover. Each recording must be accompanied by a short paper that describes the findings in your own words.
 - The final project will be similar, in that it includes a pre-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**.
- 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 Discussions and Participation	15
Quizzes	15
Project I	15
Project II	15
Final Project	40
TOTAL	100

Grading Scale	
A	89 - 100
B+	81 - 88
B	74 - 80
C+	67 - 73
C	61 - 66
D	51 - 60
F	0 - 50

IMPORTANT RULES AND POLICIES

- ❖ 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](#).
