

BIOL 447-002: Systems Neurobiology

COURSE SCHEDULE:	TR: 10-11:20 am
INSTRUCTOR:	Farzan Nadim (farzan@njit.edu)
OFFICE HOURS:	TR: 11:30 am-12 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 7th Ed; Purves et al Editors \(2023\)](#)

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

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**

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- **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

- The course will have **two midterm exams and a final exam**.
 - 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).
- There will be no make-up quizzes.
- Class participation is part of your grade. This is assessed as three components:
 - Come to class
 - Be prepared, listen and ask questions
 - Give a response when called on

Grading Scale	
A	91 - 100
B+	85 - 90
B	80 - 84
C+	75 - 79
C	70 - 74
D	60 - 69
F	0 - 59

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

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IMPORTANT INFORMATION, RULES AND POLICIES

1. **Emergency Support:** NJIT Public Safety connects you to emergency support systems - 973.596.3111. **For medical, psychological or psychiatric emergencies:** University Hospital Crisis 973.623.2323. **To report a concern about another student's well being:** reach out to the NJIT CARE Team (<https://www.njit.edu/care>) or the Dean of Students Office 973.596.3466. **Mental Health and Stress Management Center for Counseling and Psychological Services (C-CAPS).** If you or someone you know is feeling overwhelmed, depressed, and/or in need of support, services are available: <https://www.njit.edu/counseling/gethelp>
2. **Accommodation and support services for students with disabilities:** The Office of Accessibility Resources and Services (OARS) offers long term and temporary accommodations for undergraduate, graduate and visiting students at NJIT. For further information regarding self identification, the submission of medical documentation and additional support services provided please visit the [OARS website](#).
3. **If you already know that you will miss an exam or assignment,** discuss it with me (the instructor) beforehand. Otherwise, **if you miss an exam or assignment** 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 **NJIT requires us to report any academic misconduct** to the Dean of Students Office. 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 score of 0 for an assignment, a grade of F for the course, 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](#), please contact the [Dean of Students Office](#).