

## Systems Neuro: BIOL 447-002 / 447-H02 / 641-002

- COURSE SCHEDULE: MW 10-11:20 am
- INSTRUCTOR: Farzan Nadim ([farzan@njit.edu](mailto:farzan@njit.edu))
- OFFICE HOURS: MW: 11:30 am-12 pm or ZOOM (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; Augustine et al Editors \(2023\)](#)

[Neuroscience, 7e 9780197616246 STUDENT25 DTS Flyer and 1 more item](#)

Chapters 8-19, 28, 30.

Knowledge of Chapters 2-7 is required as prerequisites for this course.

### 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**
- **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

## IMPORTANT INFORMATION, RULES AND POLICIES

1. **Emergency Support:** NJIT Public Safety connects you to emergency support systems - 973.596.3111.
  - a. For medical, psychological or psychiatric emergencies: University Hospital Crisis 973.623.2323.
  - b. 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.
  - c. 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. **Accommodations for students with disabilities:** The NJIT 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. **Attending class**
  - a. Note the Biology [Policy on Absences](#). More than 3 unexcused absences will reduce your overall grade.
  - b. If you already know that you will miss an exam or assignment, discuss it with me (the instructor) beforehand.
  - c. 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 NJIT [Dean of Students Office](#) and ask them to inform the instructor.
  - d. Make-up assignments will be determined on a case-by-case basis and will not be in the same format or according to the same rules (e.g. grade replacement, grade curves, etc.) as the original assignment.
4. **Academic Integrity.**
  - a. There will be **ZERO TOLERANCE** for violations of academic integrity.
  - b. All assignments are checked with TurnItIn for plagiarism and AI use.
  - c. **The use of AI tools in this course's assignments is prohibited** and considered cheating.
  - d. 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](#).

- e. The use of AI tools in this course's assignments is prohibited and considered cheating.
- f. 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](#).

## GRADING POLICY AND SCALE

- The course will have three midterms and a final exam. The first midterm consists of questions on the course prerequisites.
  - Make-up exams will not be in the same format as the original assignment or follow the same rules.
- Quizzes will be administered in class and each will cover only material from the previous 2 lectures. Cheating in quizzes is treated as a violation of academic integrity (see above).
- Students in BIOL 447-H02 are required to do a final project instead of the final exam. The details of this project will be described in a Canvas assignment.
- Students in BIOL 447 and BIOL 641 will have different questions on their exams.

Assignment	%
Participation (extra credit only)	(10)
Quizzes / Homework	16
Midterm 1	10
Midterms 2 & 3 (each)	22
Final Exam or Final Project	30

Grading Scale		
	447	641
<b>A</b>	92 - 100	
<b>B+</b>	84 - 91	
<b>B</b>	75 - 83	
<b>C+</b>	69 - 74	
<b>C</b>	61 - 68	
<b>D</b>	55 - 60	N/A
<b>F</b>	0 - 54	0 - 60