



## Biology 315 Section 004: Principles of Neurobiology

**Instructors:** Dr. Kristen Severi ([severi@njit.edu](mailto:severi@njit.edu))

**Office Hours:** Virtual office hours TBD or by appointment

**Course Schedule:** Tues, Thurs 10:00-11:20 am, CKB 212

Course Website through Canvas <https://canvas.njit.edu/> (must use NJIT email!)

### Course Description:

This introductory-level course will review the basic principles of how the nervous system is organized, and how neurons, synapses and neuronal circuits function in order to produce behavior. We will work our way from the molecular level to discussing circuits, systems, and behavior, including development, sleep, memory, as well as a brief look at neurological disorders.

### Textbook:

“Principles of Neurobiology” by Liqun Luo (2016), from Garland Science, ISBN 978-0-8153-4492-6. The book is available at the NJIT bookstore. *We will rely on the textbook heavily and you are expected to complete the assigned reading BEFORE class.* Additional learning materials will be posted on Canvas.

### Learning Goals for the semester:

- 1) To understand and utilize basic concepts in cellular neuroscience.
- 2) To be able to explain how electrical currents across neuronal membranes are generated.
- 3) To be able to describe how neurons and the nervous system are built, and the relationship between structure and function of the nervous system.
- 4) To be able to describe how a neuron interacts with others to communicate in neuronal networks.
- 5) To be able to explain how sensory and motor systems function.
- 6) To be able explain the basic elements that enable functional and morphological plasticity of the nervous system.
- 7) To understand and be able to explain how basic rhythmic activity is generated and it’s functional role.
- 8) To understand the relationship between nervous system function and climate, and how that may be changing.
- 9) To develop critical thinking skills.

Students will be asked to participate in discussions of the material as they analyze problems and propose possible mechanisms used by neurons. **Weekly quizzes are aimed at reinforcing learning of the material.**

### Grading Policy and Scale:

ASSIGNMENT	%
Weekly Quizzes (worst grade dropped)	35%
Midterm Exams (16.25% x 4)	65%
<b>TOTAL</b>	<b>100%</b>

A	90.0 - 100
B+	84.0 - 89.9
B	76.0 - 83.9
C+	70.0 - 75.9
C	62.0 - 69.9
D	55.0 - 61.9
F	< 55

**Schedule and Course Outline** (subject to change due to course pacing)

Week / Date		Topic	Book Chapter
<b>Week 1</b>	1/17, 1/19	Course Introduction • Principles of signaling and organization of the nervous system • Methods	Chapter 1
<b>Week 2</b> Pre-Req Quiz (1/26)	1/24 1/26	Nerve Cells, Anatomy, Cytoarchitecture • The Membrane • General electrical properties of excitable cells <i>[Jan 23: Last day to Add/Drop a class]</i>	Chapters 1 & 2
<b>Week 3</b> Quiz 1 (1/31)	1/31, 2/2	Electrical properties of cells • Resting potential • Passive properties • Neuronal electrophysiology • I-V graph • Ionic channels, gating and ion currents	Chapters 1 & 2
<b>Week 4</b> Quiz 2 (2/7)	2/7, 2/9	Ionic channels, gating and ion currents • Action potential generation, propagation.	Chapter 2
<b>Week 5</b>	2/14 2/16	<b>MIDTERM 1 (February 14th)</b> Neuronal communication: Chemical synaptic transmission	Chapter 3
<b>Week 6</b> Quiz 3 (2/21)	2/21, 2/23	Receptors • Role of Calcium in release • Quantal release • Neurotransmitter release	Chapter 3
<b>Week 7</b> Quiz 4 (2/28)	2/28, 3/2	Neurotransmitters & modulators • Receptors • Ionotropic, metabotropic actions • Post-synaptic responses	Chapter 3
<b>Week 8</b> Quiz 5 (3/7)	3/7, 3/9	Metabotropic transmission, Short term synaptic plasticity <b>MIDTERM 2 (March 9th)</b>	Chapter 3
<i>Spring Break March 12 to March 19 – enjoy!</i>			
<b>Week 9</b>	3/21, 3/23	Sensory systems (Vision/Audition)	Chapters 4/6
<b>Week 10</b> Quiz 6 (3/28)	3/28, 3/30	Sensory Systems (Vison/Audition) Development (wiring)	Chapter 4/6, Chapter 7
<b>Week 11</b> Quiz 7 (4/4)	4/4, 4/6	Motor systems and regulation	Chapter 8
<b>Week 12</b>	4/11, 4/13	<b>MIDTERM 3 (April 11th)</b> Rhythmic behaviors	Chapter 8
<b>Week 13</b> Quiz 8 (4/13)	4/18, 4/20	Circadian activity, sleep Learning and Memory	Chapter 8 Chapter 10
<b>Week 14</b> Quiz 9 (4/25)	4/25, 4/27	Neurobiology and Climate Change Nervous system Disorders	Chapter 11
<b>MIDTERM 4</b> TBA during final exam period, not cumulative			



## BIOL 315 Course Syllabus for Spring 2023

The NJIT [Academic Integrity Code](#) will be strictly enforced!

The use of cell phones and other two-way electronic devices during exam times is prohibited!

- If you miss an exam due to a valid medical excuse, you need to provide a valid and verifiable **documentation**. The grade or retake of exams missed for valid reasons will be determined on a case-by-case basis. **There will be no makeup for missed quizzes**. A quiz missed for a valid reason submitted ahead of time will not count towards the average.
- Course Repetition Policy: An NJIT student may take a single course no more than four times (counting NJIT and other institutions), including withdrawals. If an undergraduate course is repeated at NJIT or the course is transferred from another institution, only then the lowest of the grades is excluded in computation of the cumulative GPA. All grades are shown on the student's transcript.
- Final exam conflict resolution rules: <http://www.njit.edu/registrar/exams/conflict.php>

### NJIT SUPPORT RESOURCES

#### Emergency Support

Crises Happen: If you experience a life emergency and are unsure which support services to turn to, NJIT Public Safety can connect you to emergency support systems - call 973.596.3111. For medical, psychological or psychiatric emergencies you can also call: University Hospital Crisis, 973.623.2323.

If you want to report a concern about another students' well-being you can also 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**) is committed to advancing the mental health and wellbeing of its students. 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>

#### Special Accommodations

If you have a disability or a personal circumstance that will affect your learning in this course, please let your instructor know as soon as possible so that we can discuss the best ways to meet your needs. Any student who needs accommodation for disabilities should also contact the

**Office of Accessibility Resources and**

**Services (OARS):** <https://www.njit.edu/studentssuccess/accessibility>