

## BIOLOGY 315-001: PRINCIPLES OF NEUROBIOLOGY

**INSTRUCTOR:** Jorge Golowasch

**EMAIL:** [golowasch@njit.edu](mailto:golowasch@njit.edu)

**OFFICE HOURS:** By Appointment Only (Email)

**PHONE:** 973-596-8444

**COURSE SCHEDULE:** T, F: 10:00 – 11:20AM in CKB 317

**COURSE WEBSITE:** <https://canvas.njit.edu/>

**COURSE SUMMARY:** 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, etc., as well as a brief look at neuronal disorders.

**TEXTBOOK:** "Principles of Neurobiology" by Liqun Luo (2016), from Garland Science, ISBN 978-0-8153-4492-6. Be sure to have access to Canvas (<https://canvas.njit.edu/>, login with your NJIT UCID; and use NJIT email).

**LEARNING GOALS:** At the end of the course, students will be able to:

- 1) Understand and utilize basic concepts in cellular neuroscience.
- 2) Be able to explain how to generate electrical currents across neuronal membranes.
- 3) Be able to describe how neurons are built, and how the brain's complicated structure is formed.
- 4) Be able to describe how a neuron interacts with others to communicate in neuronal networks.
- 5) Be able to explain how sensory and motor system function.
- 6) Explain the basic elements that enable functional and morphological plasticity of the nervous system.
- 7) Develop critical thinking skills.

Students will be required to participate in group discussions and instructor-led discussions of the material as they analyze problems and propose possible mechanisms used by neurons to solve them. Weekly quizzes will be used to test some of these goals and reinforce the learning of the material.

**GRADING POLICY & SCALE:**

Assignment	Percentage
Prerequisite Quiz	5%
Weekly Quizzes (worst grade dropped)	30%
Midterm Exams (16.25 x 4)	65%
<b>TOTAL</b>	<b>100%</b>

Grading Scale	
<b>A</b>	90.0 - 100
<b>B+</b>	84.0 – 89.9
<b>B</b>	76.0 – 83.9
<b>C+</b>	70.0 – 75.9
<b>C</b>	62.0 – 69.9
<b>D</b>	55.0 – 61.9
<b>F</b>	<55

**IMPORTANT RULES AND POLICIES:**

- [Academic Integrity Code](#) is strictly enforced.
- The use of cell phones and other two-way electronic devices during class or exam times is prohibited.**
- If you miss an exam due to a valid medical excuse you need to provide a doctor's note or other valid & verifiable documentation. The grade of exams missed for a valid reason will be determined on a case-by-case basis.

## BIOLOGY 315-001: PRINCIPLES OF NEUROBIOLOGY

□ Final exam conflict resolution rules: <http://www.njit.edu/registrar/exams/conflict.php>

**Course Repetition Policy:** An NJIT student may take a single course no more than four times (counting NJIT and another 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.

**SCHEDULE AND COURSE OUTLINE:** Dates listed by week; class will meet twice every week, unless otherwise noted.

WEEK / DATES			BOOK CHAP
<b>Week 1</b>	9/3, 9/6	Course Introduction • Principles of signaling and organization of the nervous system • Methods	Chap 1
<b>Week 2</b>	9/10, <b>9/13</b>	Nerve Cells, Anatomy, Cytoarchitecture • The Membrane • General electrical properties of excitable cells <i>[Sept 13: Last day to Add/Drop a class]</i>	Chap 1 & 2
<b>Week 3</b>	9/17, 9/20	Electrical properties of cells • Resting potential • Passive properties • Neuronal electrophysiology • I-V graph • Ionic channels, gating and ion currents	Chap 1, 2
<b>Week 4</b>	9/24, 9/27	Ionic channels, gating and ion currents • Action potential generation, propagation	Chap 2
<b>Week 5</b>	<b>10/1</b> , 10/4	<b>MIDTERM 1 (Oct 1)</b> Action potential generation, propagation continued	Chap 3
<b>Week 6</b>	10/8, 10/11	Ionic channels, gating and ion currents • Neuronal communication: Chemical synaptic transmission • Receptors • Role of Calcium in release • Quantal release • Neurotransmitter release	Chap 3
<b>Week 7</b>	10/15, 10/18	Neurotransmitters and modulators • Receptors • Ionotropic, metabotropic actions • Post-synaptic responses	Chap 3
<b>Week 8</b>	10/22, <b>10/25</b>	Metabotropic transmission, Short term synaptic plasticity <b>MIDTERM 2 (Oct 25)</b>	Chap 3
<b>Week 9</b>	10/29, 11/1	Sensory systems (Vision and Audition)	Selections from Chap 4- 6
<b>Week 10</b>	11/5, 11/8	Motor system introduction	Chap 8
<b>Week 11</b>	11/12, 11/15	Motor systems and regulation	Chap 8
<b>Week 12</b>	11/19, 11/22	Motor systems and regulation continued	Chap 8
<b>Week 13</b>	<b>11/27</b>	<b>MIDTERM 3 (Nov 27)</b> <i>Tuesday 11/26 is a Thursday: no class; Wednesday 27 is a Friday: we do!</i>	
<b>Week 14</b>	12/3, 12/6	Circuits and complex behaviors Learning and Memory	Chap 9 & 10
<b>Week 15</b>	12/10	Nervous system disorders	Chap 11
<b>FINAL EXAM WEEK: DECEMBER 14-20. FINAL EXAM( 4<sup>th</sup> MIDTERM) DATE: TBD</b>			

If you can't access Canvas, you need to activate your NJIT UCID. Visit: <https://newacct.njit.edu/~accts/cgi-bin/new>