

# BIOL 315-001: Principles of Neurobiology

COURSE SCHEDULE:	Tue, Thur: 2:30 -3:50 PM in FMH 309
INSTRUCTOR:	Prof. Jorge Golowasch ( <a href="mailto:golowasch@njit.edu">golowasch@njit.edu</a> )
OFFICE HOURS:	Tue, Thur: 4pm or by appointment (Zoom)
COURSE WEBSITE:	NJIT Canvas ( <a href="https://canvas.njit.edu/">https://canvas.njit.edu/</a> )

## 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 all the way to discussing circuits, systems, and behavior, including development, sleep, memory, as well as a brief look at neurological disorders, and the effect of climate change on the nervous system and behavior.

## TEXTBOOK

“Principles of Neurobiology” by Liqun Luo (2016) (first edition), 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 each class. Additional learning materials will be posted on Canvas.

## LEARNING GOALS

At the end of the course students will be able...

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

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**COURSE OUTLINE** (This outline may change due to course pacing)

Week / Date		Topic	Book Chapter
<b>Week 1</b>	9/2 9/4	Course Introduction • Principles of signaling and organization of the nervous system • Methods • Nerve Cells, Cytoarchitecture, Anatomy	Chapter 1, 13
<b>Week 2</b> <a href="#">Quiz 1 (9/9)</a>	<a href="#">9/9</a> 9/11	The Membrane • General electrical properties of excitable cells <i>[Sept 8: Last day to Add/Drop a class]</i>	Chapters 1 & 2
<b>Week 3</b> <a href="#">Quiz 2 (9/16)</a>	<a href="#">9/16</a> 9/18	Electrical properties of cells • Resting potential • Passive properties • Neuronal electrophysiology • I-V graph	Chapters 1 & 2
<b>Week 4</b> <a href="#">Quiz 3 (9/23)</a>	<a href="#">9/23</a> 9/25	Ionic channels: gating and ion currents • Action potential generation, propagation.	Chapter 2
<b>Week 5</b>	<a href="#">9/30</a> <a href="#">10/2</a>	<b>MIDTERM 1 (Sept 30)</b> <b>No class - Wellness day</b>	
<b>Week 6</b> <a href="#">Quiz 4 (10/7)</a>	<a href="#">10/7</a> 10/9	Neuronal communication: Chemical synaptic transmission Receptors • Role of Calcium in release • Quantal release • Neurotransmitter release	Chapter 3
<b>Week 7</b> <a href="#">Quiz 5 (10/14)</a>	<a href="#">10/14</a> 10/16	Neurotransmitters & modulators • Receptors • Ionotropic, metabotropic actions • Post-synaptic responses	Chapter 3
<b>Week 8</b> <a href="#">Quiz 6 (10/21)</a>	<a href="#">10/21</a> <a href="#">10/23</a>	Metabotropic transmission • short term synaptic plasticity <b>MIDTERM 2 (Oct 23)</b>	Chapter 3
<b>Week 9</b>	10/28 10/30	Sensory systems (Vision)	Chapter 4
<b>Week 10</b> <a href="#">Quiz 7 (11/4)</a>	<a href="#">11/4</a> 11/6	Sensory Systems (Audition, Olfaction) <i>[Last Day to Withdraw from Classes]</i>	Chapter 6
<b>Week 11</b> <a href="#">Quiz 8 (11/11)</a>	<a href="#">11/11</a> 11/13	Motor systems and regulation Rhythmic behaviors	Chapter 8
<b>Week 12</b>	<a href="#">11/18</a> 11/20	<b>MIDTERM 3 (Nov 18)</b> Circadian activity, sleep	Chapter 8
<b>Week 13</b>	11/25 <a href="#">11/27</a>	Circadian activity, sleep <b>No class - Thanksgiving break begins</b>	Chapter 8
<b>Week 14</b> <a href="#">Quiz 9 (12/3)</a>	<a href="#">12/2</a> 12/4	Learning and Memory Nervous system disorders	Chapter 10, Chapter 11
<b>Week 15</b> <a href="#">Quiz 10 (12/9)</a>	<a href="#">12/9</a> 12/11	Nervous system disorders Neurobiology and Climate Change	Chapter 11 Notes only
<b>MIDTERM 4</b> during final exam period, not cumulative – TBA			

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## COMPLAINTS and ISSUES

The semester is long, but not *that* long. So, begin to study from day 1!! The most common question to me is: how can I study or how can I improve my grade? My answer is: find a study partner with whom you can exchange ideas and questions, study together and challenge each other.

The second most common question comes typically in the second half or at the end of the semester: can I get a special assignment to improve my grade? I will NOT give anyone individually a special project or assignment. There will be 4 midterms and no less than 8 quizzes that should give you ample time and opportunities to improve your grades. However, as I said, the semester is long, but not *that* long. Don't leave for later what you can do from the start!

Finally, students often ask for letters of recommendation at the end of the semester. If you contemplate asking me for one, consider 2 things:

1) If you don't participate actively in class throughout the semester, the only thing I can put in the letter is your final grade, which is completely useless.

2) Don't wait for a year or more after the course has finished to ask me for a letter. My memory is limited and what I can't remember I can't put down in a letter.

## GRADING POLICY AND SCALE

Assignment	%
Weekly Quizzes (worst dropped)	30
Midterm Exams (4 non-cumulative exams) (all count)	70
<b>TOTAL</b>	<b>100</b>

**The lowest grade (only one) of all the quizzes will be eliminated from the quiz grade average. Midterms are not cumulative, but all 4 count towards your average exam grade.**

The format for quizzes will be 4 to 5 questions at the beginning of Tuesday's class on the material covered in the previous week and last around 12-13 minutes.

Midterm exams will take place in person in the same classroom as the lectures.

Grading Scale	
A	90.0 - 100
B+	84.0 – 89.9
B	76.0– 83.9
C+	69.1 – 75.9
C	62.0 - 69.0
D	55.1 – 61.9
F	0 – 55.

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## IMPORTANT RULES AND POLICIES

- ❖ **The use of any electronic devices (watches, glasses, phones, tablets, computers) is not allowed during class and exams. Any use of such devices during exams will be immediately reported to the Dean of Students.**
- ❖ **The use of generative AI tools (e.g. ChatGPT, Grammarly, Bard, GPT-4, Copy.ai, etc) is not allowed. I will treat any use of such tools as a serious violation of academic integrity and you may fail the class. DO NOT USE IT!!**
- ❖ If you miss a midterm 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 (i.e. me). Make-up assignments will be determined on a case-by-case basis.
- ❖ **There will be no makeup for missed quizzes.** If you are late or not present without notifying the instructor **ahead of time** you will get a zero for that quiz. **It is enough for you to send me an email BEFORE the quiz starts to be excused.**
- ❖ 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.

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.

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- 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>

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## 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/studentsuccess/accessibility>

**Religious or athletic events:** expected conflicts (see schedule above) must be announced to me at the beginning of the semester (Sept 12 max).

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