NJIT BIOLOGY

Course Syllabus

SPRING 2020

BIOLOGY 315-002: PRINCIPLES OF NEUROBIOLOGY

INSTRUCTOR:	Kristen Severi	**EMAIL:**	severi@njit.edu
OFFICE HOURS:	By Appointment	**PHONE:**	973-596-8444
COURSE SCHEDULE:	M & R: 4:00PM – 5:20PM ECEC 100	**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 be able to utilize basic concepts in cellular neuroscience.
2) Explain how to generate electrical currents across neuronal membranes.
3) Describe how neurons are built, and how the brain's complicated structure is formed.
4) Describe how a neuron interacts with others to communicate in neuronal networks.
5) 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 each Tuesday are primarily aimed at reinforcing the learning of the material.**

GRADING POLICY & SCALE:

Assignment	Percentage
Pre-requisite Quiz	5%
Weekly Quizzes (best grades out of 10)	35%
Midterm Exams (15%x4 midterms)	60%
TOTAL	**100%**

Grading Scale	
A	100-90
B+	89.9-84
B	83.9-76
C+	75.9-70
C	69.9-62
D	61.9-55
F	<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.
- Final exam conflict resolution rules: http://www.njit.edu/registrar/exams/conflict.php

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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.*

SCHEDULE AND COURSE OUTLINE: Subject to change due to course pacing.

WEEK / DATES		LECTURE TOPICS	BOOK CHAP
Week 1	1/20, **1/23**	**No Class on 1/20** • Course Introduction • Principles of signaling and organization of the nervous system • Methods Pre-requisite Quiz Jan 23rd	Chap 1
Week 2 Quiz 1	1/27, 1/30	Nerve Cells, Anatomy, Cytoarchitecture • The Membrane • General electrical properties of excitable cells *[Jan 31: Last day to Add/Drop a class]*	Chap 1 & 2
Week 3 Quiz 2	2/3, 2/6	Electrical properties of cells • Resting potential • Passive properties • Neuronal electrophysiology • I-V graph • Ionic channels, gating and ion currents	Chap 1 & 2
Week 4 Quiz 3	2/10, **2/13**	Ionic channels, gating and ion currents • Action potential generation, propagation. **MIDTERM 1 (Thursday Feb 13)**	Chap 2
Week 5	2/17, 2/20	Action potential generation, propagation continued	Chap 3
Week 6 Quiz 4	2/24, 2/27	Ionic channels, gating and ion currents • Neuronal communication: Chemical synaptic transmission • Receptors • Role of Calcium in release • Quantal release • Neurotransmitter release	Chap 3
Week 7 Quiz 5	3/2, 3/5	Neurotransmitters & modulators • Receptors • Ionotropic, metabotropic actions • Post-synaptic responses	Chap 3
Week 8 Quiz 6	3/9, **3/12**	Metabotropic transmission, Short term synaptic plasticity **MIDTERM 2 (March 12)**	Chap 3
MARCH 15-22, 2020: SPRING BREAK – NO CLASSES SCHEDULED			
Week 9	3/23, 3/26	Sensory systems (Vision and Audition)	Selections from Chapters 4-6
Week 10 Quiz 7	3/30, 4/2	Sensory systems continued, Motor system introduction	Chap 8
Week 11 Quiz 8	4/6, 4/9	Motor systems, locomotion and regulation	Chap 8
Week 12 Quiz 9	4/13, **4/16**	Learning and Memory **MIDTERM 3 (April 16)**	Chap 10
Week 13	4/20, 4/23	Circuits and complex behaviors	Chap 9
Week 14 Quiz 10	4/27, 4/30	Wiring (development) of the nervous system Nervous system disorders	Chap 7 Chap 11
FINAL EXAM WEEK[1]: MAY 8-14, 2020 (FINAL TBD)[2]			

If you can't access Canvas, you need to activate your NJIT UCID. **Visit:** http://Canvas.njit.edu/rutgers_students.php

[1] The 4th Midterm exam will be given during the final exam period. There will not be a cumulative Final.

[2] Final exam conflict resolution rules: http://www.njit.edu/registrar/exams/conflict.php