

BIOLOGY 315-001: PRINCIPLES OF NEUROBIOLOGY

INSTRUCTORS:	Jorge Golowasch	EMAIL:	golowasch@njit.edu
OFFICE HOURS:	M, W: 11:30am - 1pm, Colton 435		
COURSE SCHEDULE:	M, W: 1:00 – 2:25 pm in FMH 403	COURSE WEBSITE:	http://moodle.njit.edu/

COURSE SUMMARY: This introductory-level course will review the basic principles of how neurons, synapses and neuronal circuits function. We will start at the molecular level and work our way up to discuss behavior and general systems-level issues (development of the nervous system, memory, etc).

TEXTBOOK: "From Neuron to Brain" 5/e by Nicholls et al. (2012), From Sinauer Assoc. Inc., ISBN 978-0-97893-609-0
 Be sure to have access to Moodle (<http://moodle.njit.edu/>, login with UCID; use NJIT email).

LEARNING GOALS: At the end of the course Students will be able...





- 1) Understand and utilize basic concepts in cellular neuroscience,
- 2) Relate how biological molecules work with how electrical currents are generated in neurons,
- 3) Explain how a neuron generates electrical activity in molecular terms,
- 4) Describe and explain how a neuron interacts with others to communicate in functional neuronal networks,
- 5) Explain how sensory and motor system function. Explain the basic elements in development and plasticity of the nervous system.
- 6) Develop basic critical thinking skills. This will be measured in the ability to interpret graphs, to design an experiment, and to discuss a problem.

GRADING POLICY & SCALE: 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.

ASSIGNMENT	PERCENTAGE
Participation & Weekly Quizzes	30%
Midterm Exams	35%
Final Exam	35%
TOTAL	100%

GRADING SCALE			
A	88.1 - 100	C	60.1 - 66
B+	80.1 - 88	D	50.1 - 60
B	73.1 - 80	F	0 - 50
C+	66.1 - 73		

IMPORTANT RULES AND POLICIES:

 The NJIT [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 and verifiable documentation. The grade of exams missed for a valid reason will be determined on a case-by-case basis.  **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.

BIOLOGY 315-001: PRINCIPLES OF NEUROBIOLOGY

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

WEEK / DATES		LECTURE TOPICS	NOTES
Week 1	9/3	Introduction • Principles of signaling and organization of the nervous system	Chap 1
Week 2	9/8 & 10	Nerve Cells, Anatomy and Physiology • The Membrane • Electrical properties of excitable cells <i>[Sept 8: last day to Add/Drop a class]</i>	Chap 1
Week 3	9/15 & 17	Electrical properties of cells • Neuronal electrophysiology • Interpretation of an I-V graph • Ionic channels and ion currents.	Chap 4
Week 4	9/22 & 24	Transmembrane voltages • Ion channels and signaling MIDTERM 1 (Sept 24)	Chap 5
Week 5	9/29 & 10/1	Ion channels are proteins • Ion Channels and Gating	Chap 4, 5, 6
Week 6	10/6 & 8	Action potentials • Electrical properties of membrane •	Chap 7, 8
Week 7	10/13 & 15	Ion transport • Neuronal communication • Electrical synapses	Chap 9, 11
Week 8	10/20 & 22	Chemical synaptic transmission MIDTERM 2 (Oct 22)	Chap 11
Week 9	10/27 & 29	Receptors • Quantal release • Ca ⁺⁺ hypothesis	Chap 12, 13
Week 10	11/3 & 5	Transmitter synthesis • Neuromodulators & neuromodulation	Chap 14, 15
Week 11	11/10 & 12	Neuronal Plasticity • Sensory systems	Chap 16, 19
Week 12	11/17 & 19	Auditory & Visual transduction MIDTERM 3 (Nov 19)	Chap 2, 20
Week 13	11/24 & 26	Visual system as a model of sensory systems and integration	Chap 24
Week 14	12/1 & 3	Circuits and complex behaviors	Chap 13, 14
Week 15	12/8 & 10	Neuronal development • Cell growth	Chap 15, 16

FINAL EXAM WEEK: DECEMBER 15-19, 2014