

Biology 436, Fall 2014

Neurobiology

Textbook: NEUROSCIENCE. Purves, Augustine, Fitzpatrick, Hall, et al., 2012, 5th Edition.

LEARNING OUTCOMES: *During the course of BIOL 436, students should:*

- Obtain a foundation in neuroscience from a biophysical and molecular perspective
- Develop an appreciation that research in neuroscience is ongoing, based on studies of the primary literature and recent secondary sources
- Develop skills in interpretation and analysis of data obtained from experiments in neuroscience
- Integrate basic concepts in neuroscience to attain an understanding of how the brain works
- Understand the biophysical properties underlying membrane and action potentials
- Gain knowledge and understanding of the principles of synaptic transmission and integration
- Gain an understanding of the molecular structure of ion channels, receptors, and signaling molecules and how it relates to function
- Be able to compare and contrast different modes of synaptic transmission
- Recognize the basic mechanisms of different signaling pathways
- Gain knowledge and understanding of the general principles of brain development
- Understand the principles of sensory processing in the brain in regards to touch, hearing, and vision
- Gain knowledge and understanding of how specific neuronal circuits control movement
- Define and understand the presynaptic mechanisms underlying neural plasticity and learning
- Integrate basic concepts in neuroscience to an understanding of the mechanisms of Alzheimer's dementia

Exams: Two midterms of 100 points each, a final exam of 200 pts, and graded homework and quizzes totaling 100 pts. The exams will consist mostly of short essay questions.

What you need to know for the exams:

Exam relevant material will consist of:

- 1) The content of the chapters from the textbook listed in the course syllabus.
- 2) All material covered in the lectures and documented in the handouts.

However, there will be some of this material, which for one reason or another, will not show up on the exams. Topics that fall into this category will be pointed out at the lectures. If you are in doubt you can always ask about what is relevant or not at the review sessions.

For example:

- a. No equation derivation will be on the exams.
- b. The lecture on Molecular Neurobiology I on September 18 is a review on modern molecular approaches as they relate to neurobiology, familiarity with which is useful for understanding the subsequent lectures. The content of this lecture *per se*, however, will not show up at the exams.

If you are still in doubt..... **Learn it!!!**

Grading: In this course no curve is applied. The grade of any individual is totally independent of the overall performance of the class. It takes 50% to pass, 65% to get a C, 75% to get a B-, 80% to get a B, 90% to get an A-, and 93% to get an A. Overall class scores may in rare cases be moved upward, but never downward. For the past five years both the class median and mean has been between 75-80%, or a little above.

Course Resources:

Blackboard: Reading assignments, handouts, and other course resources are posted on Blackboard.

Textbook website: There is also a web site associated with the textbook containing student quizzes, animations, etc. It can be accessed at: <http://www.sinauer.com/neuroscience5e/>

Academic Dishonesty: The class will follow Iowa State University's policy on academic dishonesty. Anyone suspected of academic dishonesty will be reported to the Dean of Students Office.
<http://www.dso.iastate.edu/ja/academic/misconduct.html>

Disability Accommodation: Iowa State University complies with the Americans with Disabilities Act and Sect 504 of the Rehabilitation Act. If you have a disability and anticipate needing accommodations in this course, please contact one of us to set up a meeting within the first two weeks of the semester or as soon as you become aware of your need. Before the meeting you will need to obtain a SAAR form with recommendations for accommodations from the Disability Resources Office, located in Room 1076 on the main floor of the Student Services Building. Their telephone number is 515-294-7220 or email disabilityresources@iastate.edu . Retroactive requests for accommodations will not be honored.

Dead Week: This class follows the Iowa State University Dead Week guidelines as outlined in <http://catalog.iastate.edu/academiclife/#deadweek>

Harassment and Discrimination: Iowa State University strives to maintain our campus as a place of work and study for faculty, staff, and students that is free of all forms of prohibited discrimination and harassment based upon race, ethnicity, sex (including sexual assault), pregnancy, color, religion, national origin, physical or mental disability, age, marital status, sexual orientation, gender identity, genetic information, or status as a U.S. veteran. Any student who has concerns about such behavior should contact his/her instructor, Student Assistance at 515-294-1020 or email dso-sas@iastate.edu, or the Office of Equal Opportunity and Compliance at 515-294-7612.

Religious Accommodation: If an academic or work requirement conflicts with your religious practices and/or observances, you may request reasonable accommodations. Your request must be in writing, and your instructor or supervisor will review the request. You or your instructor may also seek assistance from the Dean of Students Office or the Office of Equal Opportunity and Compliance.

Contact Information: If you are experiencing, or have experienced, a problem with any of the above issues, email academicissues@iastate.edu.

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Class Schedule

August	26	Introduction	
	28	The neuron, the cell membrane and membrane potential	Ch. 1, 2
September	2	The membrane potential	Ch. 2
	4	The action potential I	Ch. 3
	9	The action potential II	Ch. 3
	11	The Synapse	Ch. 5
	16	Principles of synaptic transmission <i>Synaptic potentials and integration</i> <i>Neurotransmitters and neuromodulators</i>	Ch. 5, 6, 7
	18	Molecular neurobiology I	Ch. 4
	23	Molecular neurobiology II	Ch. 4
	25	Review	
	30	EXAM I (100 points)	
October	2	Neurophysiological methods	

DEVELOPMENTAL NEUROBIOLOGY

	7	Development of the brain	Ch. 22, 24
	9	Construction of neural circuits	Ch. 23

SENSATION AND SENSORY PROCESSING

October	14	Somatic sensory perception: Touch and proprioception	Ch. 9 & pp. 717-23
	16	Nociception: Physiologic and pathologic pain	Ch. 10
	21	The auditory system	Ch. 13
	23	Vision: The eye and retina	Ch. 11
	28	Central visual processing	Ch. 12
	30	Modification of brain circuits as a result of experience	Ch. 24
November	4	Review	

