BI 437: Neurobiology Western Oregon University Spring 2012

Contact Information

Dr. Michael J. Baltzley219 Natural SciencesEmail: baltzlem@wou.eduOffice Hours: M, F10:00 a.m. - 11:30 a.m.Phone: 503-838-8832W10:00 a.m. - 12:00 p.m.

Meeting times and location

MWF	9:00 a.m. – 9:50 a.m.	NS 122
М	2:00 p.m. – 4:50 p.m.	NS 006

Course description

This course is an introduction to the basic concepts of neurobiology. We will cover cellular function, cell-to-cell communication, basic neural circuitry, and complex neural processing. We will discuss animal models used in neurobiology and learn neurobiology experimental procedures. We will learn about the common methods and drugs used in neurobiology research. By the end of the course you should have a strong foundation that you can use as you pursue your own personal interests in the diverse field of neurobiology.

Course Goals

- Understand the cellular structures of the nervous system
- Understand the chemical basis of action potentials
- Understand the chemical basis of cell-to-cell communication
- Learn about higher-order processing behind major brain functions
- Be able to critically evaluate scientific research and formulate new research ideas
- Be able to effectively communicate scientific ideas and concepts

Assigned Books

Purves, et al. 2012. Neuroscience (5th Edition). Sunderland, MA: Sinauer Associates, Inc.

Lecture

The lecture topic organization will follow the organization of *Neuroscience* by Purves et al. If you read each assigned chapter before attending lecture, the lectures will be far more valuable to you for two reasons: 1) you will already have been introduced to the terminology and concepts we are discussing; 2) you will be able to ask informed and thoughtful questions. Asking questions requires you to process facts and information and can be a wonderful way to learn and understand new concepts.

Lab

The goal of lab is to expose you to the nervous systems of a variety of animals and to some methods that are used to study nervous systems. We will begin the semester looking at neuron morphology and brain structure. You will learn immunohistochemical techniques as well as electrophysiological techniques. You will also perform a behavioral experiment with a drug manipulation.

Evaluation and Expectations

Exams

There will be two midterm exams (50 minutes each) and one final exam (110 minutes). Approximately half of the final exam will cover new material and the other half will be cumulative. The exams will cover lecture material, lab topics, and assigned readings. The exams will consist primarily of multiple choice and short answer essay questions. The goal of the exam is to evaluate your understanding of the class material, your ability to explain concepts and ideas, and your ability to apply concepts and ideas to new problems.

Discussion

We currently have 4 discussions of primary literature scheduled. A week before the discussion, I will post the paper and discussion questions on the course Moodle site. You are expected to submit your answers to the discussion questions by 5 p.m. the evening before the discussion. I will grade your answers and return them to you at the beginning of class. Your discussion grade will be based on your preparation and participation in the paper discussions.

Lab attendance

Lab attendance is required. If you cannot attend a lab meeting, please let me and your lab partners know in advance. If you let us know in advance that you will be missing a lab meeting, we may be able to work out a way for you to make-up the lab. If you have 3 unexcused lab absences, you will earn an F for the entire course.

Lab reports

We have three formal lab reports. Two lab reports will be based on prepared lab experiments/preparations. The final report will be based on an experiment investigating Betta fish aggression that we will design as a class. Experiments will be done in teams of 2, but you will write **individual** lab reports. These will be complete lab reports, including introduction, methods, results, discussion, and references sections.

Cro	dina
Gra	umg

	Letter grade	es (in percentage)
100	А	93 - 100
100	A-	90 - 92
200	B+	87 – 89
60	В	83 - 86
10	B-	80 - 82
	C+	77 – 79
100	С	73 – 76
100	C-	70 - 72
100	D	60 - 69
	F	< 60
	100 100 200 60 10 100 100 100	$\begin{array}{ccc} & Letter \ grade \\ 100 & A \\ 100 & A \\ 200 & B \\ 60 & B \\ 10 & B \\ & C \\ 100 & C \\ 100 & C \\ 100 & D \\ F \end{array}$

Learning/Physical Disability

If you have a disability that may require some accommodation, please contact the Office of Disability Services at 503-838-8250 or ods@wou.edu.

Academic Misconduct

Academic integrity is a responsibility of all students. All students are expected to uphold the highest ideals of academic integrity throughout their career. Students who commit acts of academic misconduct are subject to in-class penalties imposed by the instructor and to a hearing before Judicial Affairs with possibilities of additional penalties.

Date	Торіс	Reading
Apr 2 (M)	Introduction to course; What is a neuron? LAB: Lab Safety Leech, cockroach, and Betta fish introduction Structure and organization of nervous system	Ch. 1
Apr 4 (W)	Electrical properties of cells	Ch. 2
Apr 6 (F)	No class: Nernst and Goldman worksheet	
Apr 9 (M)	Voltage-dependent membrane permeability DUE: Nernst and Goldman worksheet LAB: Microscopes and neuron morphology	Ch. 3
Apr 11 (W)	Action potential generation Active and passive propagation	Ch. 3
Apr 13 (F)	Discussion: Hodgkin and Katz. 1949. J Physiol 108:37	-77
Apr 16 (M)	Ion channels LAB: Leech neuroanatomy	Ch. 4
Apr 18 (W)	Synapses	Ch. 5
Apr 20 (F)	Synapses	Ch. 5
Apr 23 (M)	EXAM #1 LAB: Immunohistochemistry and backfills (Leech)	
Apr 25 (W)	Neurotransmitters	Ch. 6
Apr 27 (F)	Neurotransmitters	Ch. 6
Apr 30 (M)	Ionotropic receptors LAB: Dehydration, Mounting, Imaging	Ch. 7
Apr 30 (M) 4:15 p.m.	Film screening: "Drums of Winter"	
May 2 (W)	G-protein coupled receptors Secondary messengers	Ch. 7
May 4 (F)	Discussion: Chalasani et al. 2007. Nature 450:63-71	

Tentative Schedule for Spring 2012 Term at Western Oregon

Date	Торіс	Reading
May 7 (M)	Synaptic plasticity LAB: Extracellular recordings from cockroach DUE: Leech lab report	Ch. 8
May 9 (W)	LTP, LTD	Ch. 8
May 11 (F)	Photoreception Cockroach experiment planning	Ch. 11
May 14 (M)	Photoreception LAB: Student designed cockroach experiment	Ch. 11
May 16 (W)	EXAM #2	
May 18 (F)	Visual processing	Ch. 12
May 21 (M)	Visual processing LAB: Betta experiment, part 1 DUE: Cockroach lab report	Ch. 12
May 23 (W)	Eye movements and sensory-motor integration	Ch. 20
May 25 (F)	Eye movements and sensory-motor integration Betta experiment planning	Ch. 20
May 28 (M)	Memorial Day—NO CLASS	
May 30 (W)	Discussion: WEIRD people Article TBD	
June 1 (F)	Construction of neural circuits	Ch. 23
Jun 4 (M)	Student-selected topic LAB: Betta experiment, part 2	
June 6 (M)	Student-selected topic	
June 8 (F)	Research article discussion	
June 13 (W)	FINAL EXAM: 8:00-9:50 a.m. DUE: Betta fish lab report	