

Biol 3421
Introduction to Neuroethology
Spring 2014
Tue and Thu, 1:00pm-2:30pm, McDonnell 361
<http://www.nslc.wustl.edu/courses/Bio3421/bio3421.html>

Instructor: Dr. Bruce A. Carlson
Office: Monsanto 415
Office Hours: Thu and Fri 3-4pm, or by appointment
Phone: 935-3486
Email: carlson.bruce@wustl.edu

Note: The schedule, topics covered, timing of exams, and assigned readings are all tentative and may change over the course of the semester.

Course Description: The neural mechanisms of animal behavior from an evolutionary and ecological perspective. Topics include: contributions of model systems to understanding fundamental properties of nervous system structure and function; electrical signals of sensory cells, neurons, and muscle; neural processing of sensory input; neural control of behavioral output; anatomy and physiology of sensory and motor systems; learning and memory; evolution of neural circuits.

Prerequisites: *one* of the following: Biol 3058, Biol 3411, or Psych 3401

Credits: 3 units

Course Text: Behavioral Neurobiology by Thomas J. Carew. Readings from other texts and from the primary literature will also be assigned throughout the semester; these will be posted online. The readings should be used to reinforce comprehension of material presented in lecture.

Grading and Exams:

There will be three in-term exams and one final exam. 60% of your final grade will be the sum of the scores of your best two in-term exams. 40% of your final grade will be the score on your final exam. At the end of the semester, your lowest in-term exam grade will be dropped. The remaining two in-term exams will contribute equally to your grade. You must take the final exam; you cannot drop the grade on your final exam. No makeup exams will be given. If you are forced to miss an exam, that exam will become your dropped exam grade. Although the in-term exams will focus on material covered since the last exam, *you may be required to recall material from previous exams.* The material for exams will be drawn from the lectures – the readings should be used to reinforce comprehension of material presented in lecture. The final will be cumulative. On exam days, please arrive a few minutes early to class so you will have the maximum time available to work on the exam. Please do not wear hats during exams – you will be asked to remove them. Absolutely no electronic devices may be used during exams for any reason; your phone, computer, and any other electronic data devices must be left with the instructor if you must leave the room during the exam; failure to adhere to these policies will result in failure of the exam – NO EXCEPTIONS.

The grading scale is: A+ (98-100), A (93-97), A- (90-92), B+ (87-89), B (83-86), B- (80-82), C+ (77-79), C (73-76), C- (70-72), D (60-69), F (0-59). For students taking the class

on a pass/fail basis, a C- is considered a passing grade. *The grades for each exam may be curved – the final decision regarding implementation of a curve will be made after each exam at the instructor’s discretion.*

Academic honesty and integrity: All students are expected to strictly adhere to Washington University’s policy regarding academic integrity. The policy can be found at: <http://www.wustl.edu/policies/undergraduate-academic-integrity.html>

Attendance policy: Learning is a proactive experience. As such, students are encouraged to attend every lecture. The instructor is not responsible for providing students with materials for classes they did not attend. *While in class, turn off your cell phones and do not use any electronic devices unless you are using them to take notes.*

Getting assistance: The instructor will hold regular office hours; appointments can also be made *if you are unable to attend regular office hours*. Be sure to seek assistance with enough lead time to receive a reply – for example, if you e-mail the night before an exam, do not expect a reply before the exam.

Schedule:

Lecture	Date	Topic	Readings
Part 1. Introduction			
1	01/14 Tuesday	Ethology	Pflüger & Menzel (1999); Katz (2010)
2	01/16 Thursday	Cellular Neurobiology	Carew (Ch. 1)
Part 2. Sensory Systems			
3	01/21 Tuesday	Echolocation 1	Carew (Ch. 2)
4	01/23 Thursday	Echolocation 2	Corcoran et al (2009); Parker et al (2013)
5	01/28 Tuesday	Sound Localization 1 (Christa Baker)	Carew (Ch. 3)
6	01/30 Thursday	Sound Localization 2 (Christa Baker)	Mason et al (2001); Brand et al (2002)
7	02/04 Tuesday	Motion Detection in Vision	Simmons & Young (1999)
8	02/06 Thursday	Object Recognition in Vision	Carew (Ch. 4); Quiroga et al (2005)
Tuesday 02/11 – Exam 1			
9	02/13 Thursday	Electroreception	Carlson (2011); Kalmijn (1971); Hopkins & Bass (1981)
10	02/18 Tuesday	Magnetic Orientation	Johnsen & Lohmann (2008); Gegear et al (2010); Wu & Dickman (2012)

Part 3. Motor Systems			
11	02/20 Thursday	Command Neurons	Carew (Ch. 7); Nolen & Hoy (1984)
12	02/25 Tuesday	Central Pattern Generators (<i>Paul Stein</i>)	Carew (Ch. 6); Marder (2001); Bentley & Hoy (1970); Stein (1995)
13	02/27 Thursday	Singing in Crickets	Carew (Ch. 5)
14	03/04 Tuesday	Neuromodulation	Bargmann & Marder (2013); Brezina (2010)
15	03/06 Thursday	Bird Song 1	Carew (Ch. 8); Hahnloser et al (2002)
Spring Break			
Part 4. Sensorimotor Integration			
16	03/18 Tuesday	Bird Song 2	Leonardo & Konishi (1999); Brainard & Doupe (2000)
17	03/20 Thursday	Corollary Discharges and Expectation Generation	Poulet & Hedwig (2002); Crapse & Sommer (2008)
Tuesday 03/25 – Exam 2			
18	03/27 Thursday	Jamming Avoidance Response 1	Zupanc (2004)
19	04/01 Tuesday	Jamming Avoidance Response 2	Kawasaki (1997)
Part 5. Learning and Memory			
20	04/03 Thursday	Associative Learning in Honeybees	Carew (Ch. 9)
21	04/08 Tuesday	Spatial Navigation in Rats	Carew (Ch. 12); Yartsev & Ulanovsky (2013)
22	04/10 Thursday	Food Storing in Birds	Clayton & Dickinson (1998); Dally et al (2006); Raby et al (2007)
23	04/15 Tuesday	Learning and Memory in <i>Aplysia</i>	Carew (Ch. 10)
Part 6. Evolution			
24	04/17 Thursday	Evolution of Brain and Behavior	Katz (2011)
Tuesday 04/22 – Exam 3			
25	04/24 Thursday	Brain Evolution and Speciation	Seehausen et al (2008); Carlson et al (2011)
Tuesday 05/06 1-3pm – Final Exam			