BIO3354/5454 “NEURAL BASIS OF BEHAVIOR”

FALL 2017

Instructor
Eleni Anni, PhD

352B BioSciences Building
215-204-5764
Eleni.Anni@temple.edu

Office Hours
F 1:00-3:00 pm by appointment

Class Meetings
T/R 3:30-4:50 pm, August 29 - December 7, 2017, 332 BioSciences Building

Prerequisites: BIO3352 “Systems Neuroscience” or permission of instructor

Textbook: None
Course content is based on Open Educational Resources (OER) foundational subject matter, and original research and review articles published in leading journals in the field (e.g., Science, Nature, Cell, Proceedings of the National Academy of Sciences, Trends in Neuroscience, Current Biology, Journal of Neuroscience, Journal of Experimental Biology, Journal of Comparative Physiology, etc). The content is supplemented with open-access free videos from trailblazing scientists that illustrate major discoveries in understanding different behaviors (www.ibiology.org).
Powerpoint slides of each lecture and additional material (journal articles, reports, etc) will be posted on Blackboard.

Course description
The course is designed for upper level undergraduates and graduate students who have a background in Biology/Neuroscience. It introduces the students to the fundamental principles of how the brain controls behavior under normal and pathological conditions. The material is delivered in a manner that conveys the process of discoveries. Knowledge is systematically developed from the description of classical behavioral experiments to current state-of-the-art approaches mainly produced through the National Institutes of Health “Brain Research through Advancing Innovative Neurotechnologies” initiative (www.braininitiative.nih.gov). Information, from a variety of model invertebrate and vertebrate animal systems, is integrated to understand the neural processes that underlie simple and complex behaviors. Discussion in class relates findings in model animals to human processes and behavior, including disorders, and presentations of current hot topics in the field.

Course objectives
Students will learn the principles by which the nervous system generates and controls behaviors in animals. In particular, they will develop an understanding of how information from internal and external stimuli is detected and processed and how an appropriate response is formed, and its evolution over time as a result of plasticity and learning. Specifically, students should be able to explain the critical components that lead to the production of well-studied behaviors, such as perception, localization, attention, motivation, decision making, learning, and the generation of behavior patterns in different model systems.

**Learning outcomes**

By the end of this course students should be able to recognize that:

- Neurons are the main building blocks of nervous systems that produce and control behavior.
- Neural circuits provide solutions to problems animals are faced with in detecting and encoding stimuli, and generating behavioral responses.
- Common principles of nervous system design and function exist across phyla.
- Nervous systems are incredibly precise and capable of responding to even small differences in frequency, intensity and timing of stimuli in their environment.
- Neural responses are dynamic and subject to plasticity and modulation over time.

**Course Requirements**

This is a lecture course that requires active engagement of students in class through discussion sessions to organize acquired knowledge. Students are expected to attend all lectures and tests. If circumstances prevent a student from attending a lecture or taking a test, please notify the instructor in advance, if possible.

**Quizzes and Exams**

Quizzes and exams will consist of a combination of short answer, multiple choice, true-false, and fill-in-the-blank questions. Tests for graduate students will include additional questions. Grades for the course will be posted on Blackboard.

Final grade (letter) will be based on:

- Quizzes on alternate weeks 40 points
- Midterm exam 20 points
- Final exam 30 points
- In-class participation 10 points

**Course Policies**

**Student and Faculty Academic Rights and Responsibilities**

Freedom to teach and freedom to learn are inseparable facets of academic freedom. The policy can be accessed through the following link: [http://policies.temple.edu/getdoc.asp?policy_no=03.70.02](http://policies.temple.edu/getdoc.asp?policy_no=03.70.02)

**Academic Honesty and Plagiarism**

Any form of academic dishonesty—plagiarism and cheating—is as unacceptable in this course as it is across the University and throughout higher education. Plagiarism is defined in the Bulletin as “the unacknowledged use of another person's labor, another person's ideas, another person's words, and another person's assistance.

**Disability Disclosure Statement**
Any student who has a need for accommodation based on the impact of a documented disability, including special accommodations for access to technology resources and electronic instructional material required for the course, should contact me privately to discuss the specific situation as soon as possible. You may also contact Disability Resources and Services (DRS) at 215-204-1280 in 100 Ritter Annex to learn more about the resources available to you. Reasonable accommodations for all students with documented disabilities will be provided by the DRS in coordination with the instructor.

Technology Usage Policy
Read Temple University’s Technology Usage policy which includes information on unauthorized access, disclosure of passwords, and sharing of accounts. The Temple University Technology Usage Policy can be accessed at http://policies.temple.edu/PDF/84.pdf

Resources

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<td>Sensory guidance</td>
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<td>Neuronal control of motor output</td>
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<td>Rhythmic motor patterns; Review</td>
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