**BIOL 3352/5452: Systems Neuroscience – Spring 2020**

**Instructor**
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215-204-5764
Eleni.Anni@temple.edu

**Office Hours**
Friday 2:00 am - 5:00 pm by appointment
Email through Canvas to schedule appointment

**Class meetings**
Tuesday/Thursday 9:30-10:50 am
January 13 – April 27, 2020
408 Wachman Building (No 64 in map)
[https://www.temple.edu/iss/future-students/documents/campus_map.pdf](https://www.temple.edu/iss/future-students/documents/campus_map.pdf)

**Prerequisites**
BIOL/CHEM/MATH as per bulletin [https://bulletin.temple.edu/courses/biol/](https://bulletin.temple.edu/courses/biol/)

**Textbook**
“Neuroscience: Exploring the brain” by Mark F. Bear et al.
Wolters Kluwer, Inc.
ISBN: 978-0781778176
*The textbook is on reserve in Charles Library*

Power point slides with notes of each lecture and related material (journal articles, reports, videos etc.), and student presentations will be posted on Canvas.

**Course Description**
In this course we will examine how the flow of ions provides the foundation for membrane potential and the generation of electric signals in neurons (action potential), in concert with the diverse groups of ion channels, transporters and pumps. In addition, we will discuss how neurons communicate with each other (synaptic transmission) and nonneuronal cells. Finally, we will explore the circuits that underlie simple and complex behaviors (sensory and motor systems), as well as how circuitry defects cause neurological diseases.

This course includes an *in silico* lab with three components, which explores the principles of electrical excitability of neurons.
Course Objectives
Students taking this course will learn how nerve cells develop excitability and electrical properties, how synaptic function is generated, and how those properties are used for encoding information received from the environment and higher order function in the nervous system. Moreover, cellular and molecular processes in neurological pathologies in humans will be discussed.

Learning Outcomes
By the end of this course students should be able to
- Understand the specifics of ion flow and contribution to electrical signaling in the nervous system.
- Appreciate the role of ion channels, transporters and receptors.
- Explore the differences in the mechanisms of synaptic transmission.
- Understand how these basic cellular and molecular components integrate to encode and decode information about the outside world and internal states, as in the sensory and motor systems (taste, smell, vision, hearing, movement).

Course Requirements
This is a lecture course that requires active engagement of students in class through discussions, presentations and peer-evaluations. Readings of assigned chapters and related material should be done before class meetings.

Students are required to attend all classes. If a student arrives late, he/she should stay at the backrow seats not to disturb the class. Students will be marked absent when they are not available before the register is taken away, mostly 5 or 10 minutes within the start of the session. If circumstances prevent a student from attending a lecture, or arriving on time, please notify the instructor in advance.

Tests
Quizzes and exams will consist of a combination of multiple choice, true-false, fill-in-the-blank questions and short answers. Tests for graduate students will include 20% additional questions. Undergraduate students may answer the graduate level questions for credit. Tests will be reviewed in class the following week. Grades for the course will be posted on Canvas. Missed tests will NOT be rescheduled. In class presentation on Hot topics in Neuroscience is optional. Students may present in class primary scientific literature on current high-impact topics in the field for extra credit. Graduate students are required to make a presentation.

Final grade (letter) will be based on the following activities and calculated according to http://www.temple.edu/registrar/students/academichistory/gpa.asp
- Tests
  - Quizzes (1/23, 2/6, 2/20, 3/26, 4/9) 250 points
  - Midterm exam (3/12) 200 points
  - Final exam (4/30; 8:00-10:00 am) 400 points
• *In silico lab (1/30, 2/13, 2/27) 100 points
• Test questions (1 question/test) 10 points
• Attendance 40 points
• Presentation (optional) 100 points

The Simbio software (https://simbio.com/) will be used for teaching in an inquiry-driven learning style the concepts of diffusion, osmosis and action potential. These modules engage students in the scientific process as they discover key concepts via experimentation using realistic interactive simulations of biological systems. Simbio requires a paid subscription. Your participation on Simbio will count toward 10% of your final grade. In order to receive your points per lab, you must post your lab report by Sunday 11:59 pm deadline for submissions for each grading period.

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/PDF/99.pdf

Use of cell phones in the classroom is NOT permitted. A number of surveys and studies suggest that cell phones use in classroom is a distraction for the user but also to neighboring students. Data show that cell phones use in classroom results in decreased ability to paying attention, taking lower quality notes, retaining less information and doing worse on tests (see e.g. Mayer & Moreno, 2010; Rosen et al, 2011; Kuznekoff & Titsworth, 2013).

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. The policy can be accessed through the following link: http://policies.temple.edu/PDF/398.pdf

Disability Disclosure Statement
Any student who has a need for accommodations based on the impact of a documented disability or medical condition should contact Disability Resources and Services (DRS) in 100 Ritter Annex (drs@temple.edu; 215-204-1280) to request accommodations and learn more about the resources available to you. If you have a DRS accommodation letter to share with me, or you would like to discuss your accommodations, please contact me as soon as practical. I will work with you and with DRS to coordinate two reasonable accommodations for all students with documented disabilities. All discussions related to your accommodations will be confidential.
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 https://computerservices.temple.edu/technology-usage-policy

Resources
Access your course materials at Canvas (canvas.temple.edu), Databases, journal articles, and more at Temple University Libraries (http://library.temple.edu/); Obtain 24/7 technology assistance at Computer Services Helpdesk (https://computerservices.temple.edu/lab/contact-us).
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