BIO3358/5358: “CELLULAR AND MOLECULAR NEUROSCIENCE”

SPRING 2017

Instructor
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Class
Monday/Wednesday/Friday 10:00-10:50 am, 332 BioSciences Building

Office Hours
Friday 11:00 am-1:00 pm or by appointment

Prerequisites
BIO3096 “Cell Structure and Function” or permission of instructor

Textbook
“From Neuron to Brain”
John G. Nicholls et al.
Sinauer Associates, Inc.
ISBN: 978-0878936090

The textbook is on reserve in the Paley Library.

Powerpoint slides with notes of each lecture and additional material (journal articles, reports, videos etc.) will be posted on Blackboard.

Course Description
This course is designed for upper division undergraduate and graduate students who have a background in Biology/Neuroscience. The primary focus is on how neurons communicate and form the circuits that underlie complex behaviors. The course examines specifically how the flow of ions provides the foundation for membrane potential and the generation of electric signals in neurons. In addition, the structure/function of ion channels and their diversity will be discussed, as well as the molecular physiology of synaptic transmission and synaptic plasticity. Finally, we will explore how neurons organize in networks and neural coding of behaviors and neurological diseases.

Course Objectives
Students taking this course will learn how ion channels and other components of nerve cells give rise to electrical excitability and synaptic function, and how those properties are used for coding
information and higher order function in the nervous system. Moreover, neurological pathologies in humans will be studied to highlight cellular and molecular processes.

**Learning outcomes**
By the end of this course students should be able to:
- Understand the specifics of ion flow and contribution to the basis of electrical signaling in the nervous system.
- Appreciate the diversity of ion channels and postsynaptic receptors.
- Recognize 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, and to form the foundation for complex behaviors, such as learning and memory.

**Course Requirements**
This is a lecture course that requires active engagement of students in class through discussion. Students will be required to participate in instructor-led discussions of the material, analyze problems and propose potential mechanisms used by neurons to solve them. Graduate students will present in class current research in relevant advanced topics.

Students are expected to attend all lectures and exams. If circumstances prevent a student from attending a lecture or taking an exam, please notify the instructor in advance, if possible. Class meetings will be held January 17- May 1, 2017.

**Quizzes and Exams**
Quizzes and exams will consist of a combination of short answers, multiple choice, true-false, and fill-in-the-blank questions. They will be used to test and reinforce the learning of the material. Tests for graduate students will include additional questions. Grades for the course will be posted on the Blackboard.

Final grade (letter) will be based on:
- Quizzes (1/27, 2/10, 2/24, 3/31, 4/14) 40 points
- Midterm exam (3/10) 20 points
- Final exam (5/5; 8:00-10:00am) 30 points
- In-class participation 10 points

**Course Policies**
**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 the instructor 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](http://policies.temple.edu/PDF/84.pdf)

Resources

<table>
<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>Topic</th>
<th>Reading</th>
<th>Tests</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1/18</td>
<td>Principles of signaling and organization</td>
<td>Chapter 1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>1/23</td>
<td>Ionic basis of resting potential</td>
<td>Chapter 6</td>
<td>Quiz 1</td>
</tr>
<tr>
<td>3</td>
<td>1/30</td>
<td>Ion channels and signaling</td>
<td>Chapter 4</td>
<td></td>
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<tr>
<td>4</td>
<td>2/6</td>
<td>Structure of ion channels</td>
<td>Chapter 5</td>
<td>Quiz 2</td>
</tr>
<tr>
<td>5</td>
<td>2/13</td>
<td>Ionic basis of action potential</td>
<td>Chapter 7</td>
<td></td>
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<tr>
<td>6</td>
<td>2/20</td>
<td>Electrical signaling in neurons</td>
<td>Chapter 8</td>
<td>Quiz 3</td>
</tr>
<tr>
<td>7</td>
<td>2/27</td>
<td>Ion transport across cell membranes</td>
<td>Chapter 9</td>
<td></td>
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<tr>
<td>8</td>
<td>3/6</td>
<td>Properties and functions of neuroglia</td>
<td>Chapter 10</td>
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<tr>
<td></td>
<td></td>
<td>Review</td>
<td></td>
<td>Midterm exam</td>
</tr>
<tr>
<td>9</td>
<td></td>
<td>SPRING BREAK</td>
<td></td>
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</tr>
<tr>
<td>10</td>
<td>3/20</td>
<td>Direct synaptic transmission mechanisms</td>
<td>Chapter 11</td>
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</tr>
<tr>
<td>11</td>
<td>3/27</td>
<td>Indirect synaptic transmission mechanisms</td>
<td>Chapter 12</td>
<td>Quiz 4</td>
</tr>
<tr>
<td>12</td>
<td>4/3</td>
<td>Neurotransmitters release</td>
<td>Chapter 13</td>
<td></td>
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<tr>
<td>13</td>
<td>4/10</td>
<td>Neurotransmitters in CNS</td>
<td>Chapter 14</td>
<td>Quiz 5</td>
</tr>
<tr>
<td>14</td>
<td>4/17</td>
<td>Transmitters: From synthesis to inactivation</td>
<td>Chapter 15</td>
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<tr>
<td>15</td>
<td>4/24</td>
<td>Synaptic plasticity</td>
<td>Chapter 16</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>5/1</td>
<td>Review</td>
<td></td>
<td>Final exam</td>
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