BIOL 3405 Section 01 Neurobiology                        Fall 2016
CRN: 16816
Time: Tues. & Fri. 9:50-11:30 AM
Location: Hurtig Hall Room 129

Instructor: Jamie G. Bunce, PhD
Email: j.bunce@northeastern.edu *Email is the best way to contact me.
Phone: 617-373-6327
Office hours: Tuesday and Friday 12:30-2:30PM and by email appointment.
Office: 382 Nightingale Hall (Please use the black phone at the entrance to the 3rd floor to dial my extension [x6327] and I will escort you to the office).
Prerequisites: BIOL 1103, BIOL 1113, BIOL 2297, BIOL 2299, ENVR 2290, EEMB 2290 or PSYC 3458.

Course Description:
We will explore neurobiology from synapses to neural systems. Over the course of the semester you will learn about cellular physiological processes that mediate neuronal dynamics and communication. We will also study how neurons are combined into networks and the emergent function of these neural systems in relation to behavior, dysfunction and disease. We will expand on fundamental concepts via scientific articles from the current literature.

Learning Outcomes:

By the end of the course students will be able to:
1. Identify and describe the key components and functions of the central and peripheral nervous systems
2. Explain core principles of neuronal signaling, information coding, and processing in neural circuits and systems.
3. Describe fundamental concepts that apply to several advanced topics in neurobiology
4. Evaluate, orally, current theories and relevant scientific research on an advanced topic in neuroscience.

Class Web Site: Class documents, assignments, grades, and resources will be available on our Blackboard site, which also includes communication tools for the class. Check the site regularly for updates and announcements.

Reading Assignments: There is no required textbook for this course. If you wish to have a resource to reinforce what we cover in class, I recommend the following textbook:


Material covered in the textbook that is not addressed in lecture will NOT appear on exams. A copy of this textbook is on reserve in Snell Library.
We will read and present 12 scientific research articles over the course of the semester. Content from those articles will appear on exams and quizzes. Please see “group presentations” below.

**Top Hat:** See the Class Format section for additional information. Top Hat is a cloud based interactive lecture tool which I will use to monitor attendance, gather your feedback and pose questions each class period. Top Hat question will be weighted 50% for accuracy and 50% for participation. Classroom questions can be completed only during lecture. Throughout class, I will have a Top Hat Discussion open for any questions that arise. I will do my best to monitor open questions/feedback and answer/address the issue during class, after class via email, or revisit these topic during the next class.

**Class Format:** This course will consist of in-class lectures and discussions covering neurobiological topics and concepts. Whenever possible, we will incorporate primary research articles and case studies from the medical literature to frame content. To make lectures more engaging and to encourage participation and attendance, interactive questions will be posted to Top Hat which you will answer on your smart phone, laptop or tablet device during each class. You will receive an invitation to join our class Top Hat.

My lecture slides will be posted on Blackboard before class to help with note taking.

**CO-OP:** If, at any time, we are covering a topic that is relevant or related to your co-op experience (or one you are planning to do), please share your experience and/or insight with the class.

**Grading:**

Exams: 3 @ 65%
Quizzes: 3 @ 25%
Group Presentation: 5%
Attendance & Participation: 5% (if you have > 90% attendance you get 100%)

Exam and quiz format may consist of: Multiple choice (scantron), Short Answer, Fill-in the blank, Matching, Problem Solving, True/False.

Quizzes are designed to encourage you to regularly review your notes as well as assess the effectiveness of my lectures. Quizzes will be given at the beginning of class and should take no more than 30 minutes to complete. No make up quizzes will be given. Quizzes will account for 25% of your final grade.

Group Presentation: As a group, you will read and present (powerpoint) a primary research article relevant to the topic *du jour* which I will provide. Each group will have 20-30 minutes to present their article to the class. Presentations should be organized around the article figures. Each group member should present 1 figure highlighting what the figure shows and why it is significant to the overarching hypothesis of the article. To introduce the figure, each presenter should provide necessary/appropriate context to the audience, briefly highlighting relevant background information, relating findings to prior figures (when applicable) and briefly
summarizing methodology used. The primary focus should be on the results and conclusions conveyed by the figure along with an evaluation of how the research was conducted and its significance. Groups are strongly encouraged to practice presentations ahead of time, to ensure that it will not exceed the 30 minute time limit. Grading will reflect incomplete presentations. I will provide a handout with more detailed information on presentations and the rubric I will use for assessments. In the week following the presentation, groups should email me the presentation slides and each group member should complete a write-up, summarizing in their own words the figure they presented. Summaries should include what the figure showed and its relevance to the article narrative. Additionally, what questions emerged from the figure and how did you go about answering those questions? Finally each group member should compose 1 multiple-choice question (with answer indicated) pertaining to relevant info from the article for potential inclusion on quizzes/exams. I will post questions and presentation slides on Blackboard for the class to review and prepare.

Grades will be on the ABCDF scale with +/- modifiers. It is anticipated that letter grades for this course will be assigned to the scale below.

A  93-100 4.0  
A-  90-92 3.6  
B+  87-89 3.3  
B  83-86 3.0  
B-  80-82  
C+  77-79  
C  73-76  
C-  70-72  
D+  67-69  
D  63-66  
D-  60-62  
F  <60

**Course Policies:**

This course follows the College of Science Academic Course Policies, which are viewable at this link:


**Exam Policy:** Students will only be allowed to use the following materials during an exam: writing utensils, plain white scrap paper, and a basic calculator (if necessary). Students will not be allowed to use text books, notes, cell phones, e-readers, tablets or laptops during the exam period. Students caught with any of these materials with receive and automatic zero for the exam. Students will have the allotted class time to complete exams. Exams will primarily cover material from the current period, though knowledge of fundamental concepts covered earlier in the semester will be assumed. Make up exams can be scheduled should you have an unavoidable health or personal emergency. Only one make up exam per student per semester will be offered.
Please contact me as soon as possible if you have a conflict with an exam so we can make the appropriate accommodations for you.

_Cell Phone Policy:_ If there is a problem or emergency please excuse yourself and step outside of the classroom to take or make a phone call. Students who are disruptive during the class period will be warned, and receive a 2% deduction from your final grade for each time the instructor needs to address you after the first warning.

**Getting Help:** Come to my office hours; make an appointment to see me at another time; email me with questions.

**Peer tutoring:**
Students requiring additional help are advised to come to my office hours (see above) with questions. Peer tutoring is also available through the Peer Tutoring Program via this link: http://www.northeastern.edu/undergraduate/mentoring-advising/

**Statement on Academic Integrity:**
I adhere to Northeastern’s Policy on academic integrity:

http://www.northeastern.edu/osccr/academic-integrity-policy/

Academic dishonesty is a serious offense and renders the offender liable to disciplinary action. Students caught violating the policy will be penalized according to the severity of the offense. Possible penalties range from grade reduction to failure of the course.

This course follows the College of Science Academic Course Policies, which are viewable at this link: http://www.northeastern.edu/cos/wp-content/uploads/2014/11/Northeastern-COS-Policies-Template.pdf

**Students with Disabilities:**
Accommodations will be made for students with verifiable disabilities. In order to take advantage of available accommodations, students must register with the Disability Resources Center (DRC), 20 Dodge Hall (x2675).

**Neurobiology CRN 16816 Fall 2016 Schedule**

In the event that class is canceled, all due dates (readings, quizzes, exams) will be shifted to the next class.

- **09/09** Lecture 1: Introduction: Neuronal Properties pg 1-21
- **09/13** Lecture 2: Membrane Potentials pg 25-55
- **09/16** Lecture 3: Local Signaling: Ionic Conductance pg 27-31
- **09/20** Lecture 4: Propagated Signaling: Action Potentials pg 25-55
09/23 QUIZ 1;
Lecture 5: Electrical Responses pg 57-75

09/27 Lecture 6: Ion Channels and Transporters pg 57-75

09/30 Lecture 7: Synaptic Transmission I: Presynaptic pg 77-106

10/04 Lecture 8: Synaptic Transmission II: Postsynaptic pg 77-106

10/07 Lecture 9: Synaptic Transmission III: Neurotransmitter and Receptors pg 109-139

10/11 Exam I

10/14 Lecture 10: Sensory Systems Overview 257-275
PRESENTATION 1: Imai et al., 2016

10/18 Lecture 11: The Chemical Senses pg 321-350
PRESENTATION 2: Murata et al., 2015

10/21 Lecture 12: Somatosensory and Auditory Systems pg 189-208; 277-302
PRESENTATION 3: Leaver and Rauschecker, 2016

10/25 Quiz 2;
Lecture 13: Vision I pg 229-256

10/28 Lecture 14: Vision II pg 257-276
PRESENTATION 4: Arroyo et al., 2016

11/01 Lecture 15: Motor Systems I: Motor Circuits and Control pg 353-374
PRESENTATION 5: Hilton et al., 2016

11/04 Lecture 16: Motor Systems II: Modulation of Movement and Parkinson’s pg 375-433
PRESENTATION 6: Escande et al., 2016

11/08 Exam II

11/11-NO CLASS VETERANS DAY

11/15 Lecture 17: Sleep and Circadian Rhythms pg 623-645
PRESENTATION 7: Andrillon et al., 2016

11/18 Lecture 18: Neurobiology of Emotions pg 647-667
PRESENTATION 8: Di et al., 2016
PRESENTATION 9: Funk et al., 2016
11/22 Lecture 19: Learning and Memory I pg 695-715; 163-184
PRESENTATION 10: Ho et al., 2015

11/25 Thanksgiving

11/29 Quiz 3;
Lecture 20: Learning and Memory II

12/02 Lecture 21: Neurodevelopment pg 477-505
PRESENTATION 11: Takahashi et al., 2016

12/06 Lecture 22: Degeneration, Regeneration and Repair pg 559-583
PRESENTATION 12: Mei et al., 2016

EXAM 3 (TBA DURING FINALS WEEK)

This syllabus is subject to change with notification.