	Advanced Neurophysiology NSCI427/627
	Credits: 3**, Section:** 010
	Semester: Fall**, Year:** 2019
	Meeting Days, Times, Location and Room: Tue/Thu 12:30 – 1:45 PM, Purnell Hall Room 324B

Instructor Information

Instructor name	Dr. Amy Griffin
E-mail address	amygriff@psych.udel.edu
Website	https://www.psych.udel.edu/people/faculty/amygriff
Office location	113 Wolf Hall
Office hours	Mondays, 11:00 AM – noon
Phone number	302-831-2575
Instructor information	I grew up northwest Ohio. I earned my B.A. in Psychology from Baldwin-Wallace University and my Ph.D. from Miami University. I then was awarded a postdoctoral fellowship from the National Institutes of Mental Health to study with Dr. Michael Hasselmo the late Dr. Howard Eichenbaum at the Center for Memory and Brain at Boston University. My area of expertise is the neurobiology of learning and memory. Specifically, my lab uses neurophysiology and optogenetic techniques in freely-moving rats to understand the circuitry underlying memory-guided behavior. Since joining the University of Delaware Department of Psychological and Brain Sciences in 2007, I have taught classes at all levels from introductory undergraduate lecture courses to special-topic graduate seminars. One of the most valuable lessons that I have learned from my classroom teaching experience is that students respond best when they are active participants in their own learning. Therefore, I take an interactive approach to instruction in order to foster student engagement with the material. I am a strong believer in the team-based learning approach and have begun to implement this style of instruction in all of my courses. I am excited to share my passion for neuroscience with you this semester.

Course Description

Pre-requisites

C- or better in NSCI320.

Description

This class will use the **Team-Based learning (TBL)** approach. Students were randomly assigned to a team before the semester began. The teams will remain the same for the entire semester unless the instructor determines a need for a team change. The semester is divided into 4 learning modules based on core topics (See Canvas for details).

Learning Outcomes

At the end of the semester, students will:

1. Develop an in-depth understanding of how neural signals are generated and transmitted
2. Demonstrate the ability to read, comprehend, and critically evaluate primary-source research articles
3. Use course content in thinking and problem-solving
4. Demonstrate the ability to work in a team

Learning Resources

Required Learning Materials

“From Neuron to Brain” by John G. Nicholls, et al., 5th edition.

“Neurons in Action” by Moore & Stuart, Version 2.

> Neurons in Action is a software learning tool that you must install on your computer. You can either purchase the CD/booklet package or you can purchase the digital access code here, then go to this link and enter your access code to download the software. **Please purchase and install the software before the first day of class!**

Technology

All course materials, assignments, and grades will be available on Canvas.

At least one member from each team will need to bring a laptop to class for in-class exercises.

Course Assessment

Final Grade Breakdown

Scores in three major performance categories will determine the grades in this class: Individual performance (consisting of individual exams, application problems, and quizzes), Team performance (consisting of in-class TBL exercises), and Peer evaluation. All team members will receive the same score on team performance assignments, except in the case of an unexcused absence, in which case, the absent student will receive a no credit.

Reading quizzes (Score out of 5)

There will be a multiple choice quiz that students will take on canvas prior to each Tuesday class meeting (due Monday at 11:59 pm).

Team-Based learning assignments (Pass/Fail)

In-class exercises will include exercises from Neurons in Action as well as reading original scientific papers surrounding some of the main discoveries and controversies in this field. Each exercise will require one member from each team to turn in an assignment at the end of the class. Readings and assignments can be found on Canvas.

Application problems (Pass/Fail)

Application problems are designed to test students' understanding of the material covered in the reading, lecture and TBL.

Exams (Pass/Fail)

There will be a midterm and a final, both comprehensive that will be take-home. See schedule for due date.

Peer Evaluation (Score out of 5)

At the end of the semester, each student will be ranked by their teammates on their cooperativeness and contribution to team ideas, planning, and success using an anonymous online form. The scores will be averaged to determine the final peer evaluation score for each student.

Grading Scale

Final grades will be based on the following minimum requirements for each category:

	A	B	C	D
Reading quizzes average score	90%	80%	70%	60%
Number of passed TBLs	18	16	14	13
Number of passed application problems	8	7	6	5
Pass the Midterm & Final	✓	✓	✓	✓
Peer Evaluation average score	4	3	3	2

Each student will receive **3** "tokens" at the beginning of the semester. These tokens can be used to…

- retake a quiz or application problem
- replace a missed or late assignment
- retake missed questions on the midterm (in the case of a failure)

Students who have all 3 tokens remaining at the end of the semester do not have to take the final exam!

Course calendar

Week	DATE	Module	Lecture	TBL	Read	Readiness assessment	Application
1	Tuesday, August 27, 2019	Course Introduction	Syllabus overview	Intro to NIA, Observe AP (ungraded)		Install NIA, Read syllabus	
	Thursday, August 29, 2019	**Class canceled**					
2	Tuesday, September 3, 2019	Module 1: Ion channels	1.1 Ion channel behavior	TBL 1.1: NIA: Chattering ion channels	Chapter 5	Quiz 1.1	
	Thursday, September 5, 2019		1.2 Ionic current	TBL 1.2: Nernst equation exercises			Application 1.1
3	Tuesday, September 10, 2019		1.3 Cys-loop receptors	TBL 1.3: NIA: Threshold to Fire or not to fire	Chapter 6	Quiz 1.2	
	Thursday, September 12, 2019		1.4 Voltage-gated channels	TBL 1.4: NIA: Voltage-clamping a patch			Application 1.2
4	Tuesday, September 17, 2019	Module 2: Neural Signaling	2.1 Resting Membrane Potential	TBL 2.1 NIA: Equilibrium potentials	Chapter 7	Quiz 2.1	
	Thursday, September 19, 2019		2.2 Action Potential	TBL 2.2 NIA: The Na action potential			Application 2.1
5	Tuesday, September 24, 2019		2.3 Effects of axon diameter on signaling	TBL 2.3 NIA: The passive axon	Chapter 8	Quiz 2.2	
	Thursday, September 26, 2019		2.4 Effects of myelin on signaling	TBL 2.4 NIA: Partial demylination			Application 2.2
6	Tuesday, October 1, 2019		2.5 Sodium, potassium, calcium transport	TBL 2.5 TBA	Chapter 9	Quiz 2.3	
	Thursday, October 3, 2019		2.6 Chloride & Neurotransmitter transport	TBL 2.6 TBA			Application 2.3
7	Tuesday, October 8, 2019		**Midterm review session**				
	Thursday, October 10, 2019		**No class - Take-home midterm due at 11:59 PM**				
8	Tuesday, October 15, 2019	Module 3: Synaptic transmission	3.1 Neuromuscular junction	TBL 3.1 NIA: The NMJ	Chapter 11	Quiz 3.1	
	Thursday, October 17, 2019		3.2 Excitatory & Inhibitory PSPs	TBL 3.2 NIA: Interactions of synaptic potentials			Application 3.1
9	Tuesday, October 22, 2019		**Class canceled - SFN conference**				
	Thursday, October 24, 2019						
10	Tuesday, October 29, 2019		3.3 G-proteins & GCPRs	TBL 3.3 GCPR controversy, Part 1	Chapter 12	Quiz 3.2	
	Thursday, October 31, 2019		3.4 Second messengers	TBL 3.4 GCPR controversy, Part 2			Application 3.2
11	Tuesday, November 5, 2019		3.5 Transmitter release	TBL 3.5 Necessity vs. sufficiency	Chapter 13	Quiz 3.3	
	Thursday, November 7, 2019		3.6 Quantal hypothesis	TBL 3.6 Quantal hypothesis explained to kids			Application 3.3
12	Tuesday, November 12, 2019	Module 4: Neural plasticity	4.1 Short-term plasticity	TBL 4.3 LTP controversy, Part 1	Chapter 16	Quiz 4.1	
	Thursday, November 14, 2019		4.2 Long-term potentiation	TBL 4.4 LTP controversy, Part 2			
13	Tuesday, November 19, 2019		4.3 Long-term depression	TBL 4.5 LTP controversy, Part 3			
	Thursday, November 21, 2019		4.4 Neural plasticity and memory	TBL 4.6 LTP controversy, Part 4			Application 4.1
14	Tuesday, December 3, 2019		**Final Exam review session**				
	Thursday, December 5, 2019		**No class - Take-home final due at 11:59 PM**				

Course Policies

Attendance

Attendance is expected for all class meetings, however sometimes emergencies and illnesses arise. To be granted an excused absence, you will need to send an email to Prof. Griffin and all members of your team at least an hour before class. The email should include the reason for your absence. Note that chronic absences and/or lateness are likely to affect your peer evaluation. Unexcused absences will result in a zero for the day. Please note that "working remotely" with your team does not count as attendance. Also note that late arrivals and early departures will result in losing half credit on that day's assignment.

Excused Absences

Absences on religious holidays listed in University calendars is recognized as an excused absence. However, please remind me of your intention to be absent on a particular upcoming holiday. Absences on religious holidays not listed in University calendars, as well as absences due to athletic participation or other extracurricular activities in which students are official representatives of the University, shall be recognized as excused absences when the student informs the instructor in writing during the first two weeks of the semester of these planned absences for the semester. If you have a cold or the flu, **please do not come to class sick!** Let me know as soon as possible that you will miss class, preferably prior to the class meeting that you will miss. In the case of a serious illness requiring you to be absent for a week or more, please go to your Dean's office for an excused absence. For the full university policy on excused absences, please follow this link: http://facultyhandbook.udel.edu/handbook/3113-student-class-attendance-and-excused-absences.

Communication with the Instructor

In the event that I need to cancel class, I will post an announcement on Canvas and you will receive a notification via email. Please make sure to set up your Canvas notifications for announcements to "Notify me right away". If you send me a question via email, please include the course number (NSCI427 or NSCI627) in the subject line. I will reply to your email within 48 hours (unless I am traveling, in which case you will receive an away message). Please note that to protect your privacy, I cannot discuss your grade over email.

Academic Integrity

Please familiarize yourself with UD policies regarding academic dishonesty. To falsify the results of one's research, to steal the words or ideas of another, to cheat on an assignment, to re-submit the same assignment for different classes, or to allow or assist another to commit these acts corrupts the educational process. Students are expected to do their own work and neither give nor receive unauthorized assistance. http://www1.udel.edu/studentconduct/policyref.html Office of Student Conduct, 218 Hullihen Hall, (302) 831-2117. E-mail: student-conduct@udel.edu .

Harassment and/or Discrimination

The University of Delaware works to promote an academic and work environment that is free from all forms of discrimination, including harassment. As a member of the community, your rights, resource and responsibilities are reflected in the non-discrimination and sexual misconduct policies. Please familiarize yourself with these policies at www.udel.edu/oei. You can report any concerns to the University's Office of Equity & Inclusion, at 305 Hullihen Hall, (302) 831-8063 or you can report anonymously through UD Police (302) 831-2222 or the EthicsPoint Compliance Hotline at www1.udel.edu/compliance. It is unacceptable and a violation of university policy to harass, discriminate against or abuse any person because of a person's race, color, national origin, gender, sexual orientation, disability, religion, age or any other characteristic protected by applicable law. Such behavior threatens to destroy the environment of tolerance and mutual respect that must prevail for this university to fulfill its educational mission. Contact the Office of Equity and Inclusion http://sites.udel.edu/sexualmisconduct/how-to-report/ if you believe a violation has occurred.

Faculty Statement on Disclosures of Instances of Sexual Misconduct

Faculty Statement on Disclosures of Instances of Sexual Misconduct If, at any time during this course, I happen to be made aware that a student may have been the victim of sexual misconduct (including sexual harassment, sexual violence, domestic/dating violence, or stalking), I am obligated to inform the university's Title IX Coordinator. The university needs to know information about such incidents in order to offer resources to victims and to ensure a safe campus environment for everyone. The Title IX Coordinator will decide if the incident should be examined further. If such a situation is disclosed to me in class, in a paper assignment, or in office hours, I promise to protect your privacy--I will not disclose the incident to anyone but the Title IX Coordinator. For more information on Sexual Misconduct policies, where to get help, and how to reporting information, please refer to www.udel.edu/sexualmisconduct. At UD, we provide 24-hour crisis assistance and victim advocacy and counseling. Contact 302-831-1001, UD Helpline 24/7/365, to get in touch with a sexual offense support advocate. For information on various places you can turn for help, click here. For more information on Sexual Misconduct policies, where to get help, and reporting information please refer to www.udel.edu/sexualmisconduct.

Inclusion of Diverse Learning Needs

This course is open to all students who meet the academic requirements for participation. Any student who has documented a need for accommodation should contact Disability Support Services and the instructor privately to discuss the specific situation as soon as possible. Disability Support Services can be reached at 302-831-4643, or dssoffice@udel.edu . DSS staff will coordinate accommodations for students. Please note: The University of Delaware is committed to all students' learning and welcomes students with disabilities. If you have a documented disability and need for an accommodation in this course, please contact the Office of Disability Support Services located at dssoffice@udel.edu or call 302-831-4643 to coordinate accommodations.

Non-Discrimination Statement, July 2017

The University of Delaware does not discriminate against any person on the basis of race, color, national origin, sex, gender identity or expression, sexual orientation, genetic information, marital status, disability, religion, age, veteran status or any other characteristic protected by applicable law in its employment, educational programs and activities, admissions policies, and scholarship and loan programs as required by Title IX of the Educational Amendments of 1972, the Americans with Disabilities Act of 1990, Section 504 of the Rehabilitation Act of 1973, Title VII of the Civil Rights Act of 1964, and other applicable statutes and University policies. The University of Delaware also prohibits unlawful harassment including sexual harassment and sexual violence.

For inquiries or complaints related to non-discrimination policies, please contact: Director, Institutional Equity & Title IX Coordinator- Susan L. Groff, Ed.D. groff@udel.edu 305 Hullihen Hall Newark, DE 19716 (302) 831-8063

For complaints related to Section 504 of the Rehabilitation Act of 1973 and/or the Americans with Disabilities Act, please contact: Director, Office of

Disability Support Services, Anne L. Jannarone, M.Ed., Ed.S. - ajannaro@udel.edu
Alison Hall, Suite 130, Newark, DE 19716 (302) 831-4643

OR contact the U.S. Department of Education - Office for Civil Rights
(https://wdcrobcolp01.ed.gov/CFAPPS/OCR/contactus.cfm)