Behavioral Neuroscience

PSYC B218-001, Spring 2022
Tue. and Thu., 8:25-9:45 am
Carpenter Library 21

Course description. Have you ever wondered how certain emotions like fear and excitement can trigger reactions throughout your body and influence the decisions you make? Or how changing hormone levels can change an individual's behavior during adolescence? In this class, we'll answer these questions and many more, examining the biology of the brain from its individual cells up to its coordinated circuits—and how these biological underpinnings influence behavior. Additionally, this class will teach you how to think and communicate like a scientist by solving research-based problems with your classmates and analyze the primary literature in a field that interests you. We'll learn how new tools are allowing researchers to ask more specific questions and reach more precise conclusions about the function of the brain and behavior.

Instructor

Ryan J. Post, Ph.D.
Visiting Assistant Professor, Bryn Mawr College, Psychology Dept.
Postdoctoral Researcher, University of Pennsylvania, Biology Dept.
Please feel free to call me either "Ryan" or "Dr. Post," whichever you are more comfortable with. My pronouns are he/him.

Contact

rpost@brynmawr.edu
Office hours: Tue. 7:15-8:15am, Bettws-y-Coed 237 and Thu. 8:00-9:00pm, Zoom (link on Moodle)
As I am a part-time faculty member at Bryn Mawr and work full-time as a neuroscience researcher off-campus, I am typically only on-campus around our class meeting times. Therefore, I am happy to meet virtually via Zoom at any time that is convenient for both of us. Please email me to schedule such a meeting.

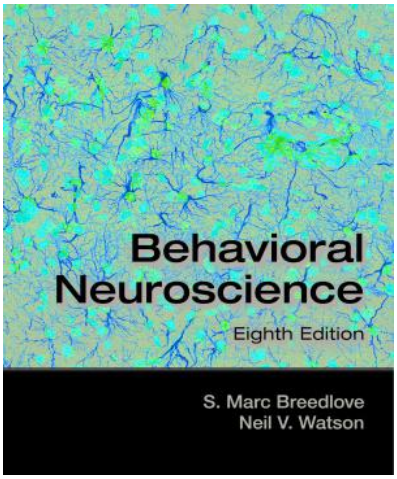
Learning outcomes. By completing this course, students will become *proficient in the basics of behavioral neuroscience* by:

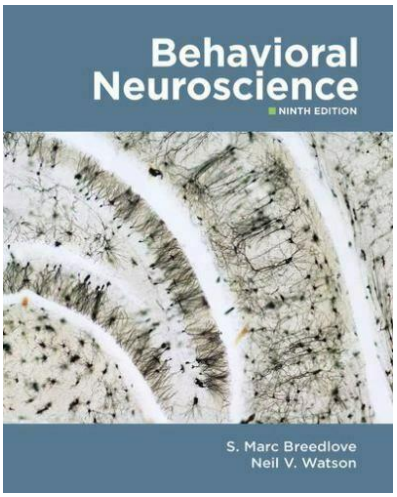
- Understanding how the central nervous system is organized and how circuits of neurons communicate with one another within this organization.
- Recognizing how different internal states and external environments affect an organism's neurophysiology and behavior.
- Appreciating how neuroscientists study the brain and the behavior it produces.

Students will learn to *think and communicate like a scientist* through:

- Critically analyzing primary literature by evaluating the evidence scientists use to support their conclusions.
- Solving research-based problems in small groups.

- Applying their knowledge of the brain and the work of scientists to a question that interests them.





Textbook. *Recommended, not required.* Breedlove, S.M. & Watson, N.V. *Behavioral Neuroscience*, 8th edition. Oxford University Press.

This textbook is recommended, but not required for this class. There are two copies of the 8th edition on reserve in Canady Library. While an ebook of the 8th edition is not available, you may obtain the ebook of the 9th edition. Textbook materials will supplement my lectures, but I will not hold you responsible for material that is not presented in my lectures.

Bryn Mawr College - Department of Psychology - Syllabus statement ensuring textbook access: The psychology department is committed to ensuring that **all** students have access to the required course text(s) without experiencing excessive financial burden. If you have concerns about your ability to secure the text(s) for this course, please reach out to me directly so that we can ensure you have access to the text(s) for the semester. Alternatively, if you prefer that your request is kept confidential, you may reach out to the department administrator, Ann Ogle (aogle@brynmawr.edu), who will work with you to secure the text(s). Please note that students will be asked to return any texts to the department at the end of the semester. As a reminder, copies of the text(s) are also available at the campus library on reserve.

Grading and course design. My goal in this course is for you learn the foundations of behavioral neuroscience and the techniques by which scientists study the brain and behavior. This is not just for the sake of knowledge itself, but so that you can consider how interesting questions in this area could be answered and critically evaluate the science that addresses such questions. To this end, I've designed an assessment scheme that reduces emphasis on exams and includes a number of assignments that require critical scientific thought and group collaboration.

Exams (50%). There are three midterm exams given throughout the semester; the average of these exams accounts for 50% of your final grade. Midterm exams will be given in-class and will consist primarily of short answer questions regarding material covered on the most recent third of the course. Make-up exams will not be offered; if you miss an exam due to a medical absence, your exam grade will be the average of the other two exams.

Assignments (25%). Assignments are a mix of problem sets to be worked on with groups in-class, and individual assignments to be completed as homework. The goal of these assignments is to offer an opportunity for you to apply the knowledge from lectures and to use your creativity to solve novel problems. Each assignment has its own rubric, and completed assignments must be submitted to Moodle prior to the deadline.

Final essay (20%). In lieu of a final exam, you will write a five-page paper that critically evaluates a topic of your choosing within the field of behavioral neuroscience. A number of assignments throughout the semester will focus on identifying your topic and developing your paper. More information on this final essay will be provided as we progress through the class.

Participation (5%). The active participation of all students is essential for this class to be a success. Our in-class meetings will be a mix of interactive lectures and group work. To receive full credit for participation, you should be present for class and actively engaged with your classmates. I will use PollEverywhere in class to gauge your learning in real-time; while your answers to these questions are not graded, your contribution to them is recorded for the sake of the Participation grade. We will also occasionally have discussion boards on Moodle for particularly difficult concepts. Instructions will be specific to each board, but in general you will be expected to both make a post and respond to a classmate's post.

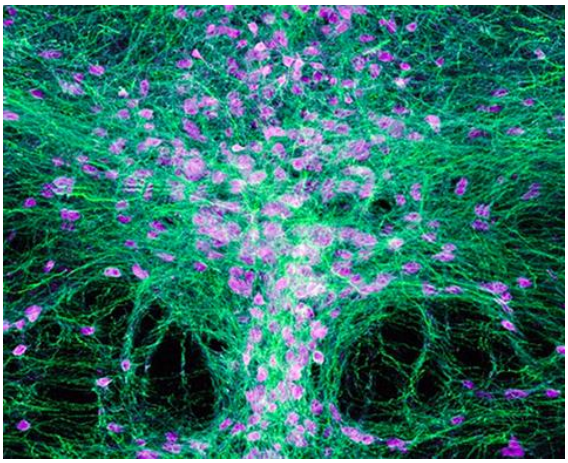
Regrade requests. If you wish to dispute the way an exam or assignment question was graded, please submit a written explanation of your dispute via email. You have *one week* following the return of your exam or assignment to make such a dispute. If you believe that an arithmetic mistake was made in tallying the points on your assignment or exam, but you do not wish to dispute the grading of any individual question, you may bring me the exam or assignment before or after class so that the grade can be retallied and remedied if needed.

Extension policy. If you believe you need an extension on an assignment due to workload from other classes or health concerns, please request one from me as early as possible. We will discuss your situation and reach a mutually agreeable solution. Please note that all extension requests must be made *at least* 24 hours prior to the deadline; however, earlier is better.

Determination of final grade. An average grade out of 100% will be calculated for each of the above sections (Exams, Assignments, etc.). The final score out of 100 will be calculated according to the weights listed: Exams (50%), Assignments (25%), Final essay (20%), Participation (5%). Your final score will be rounded to the nearest whole number and final grades will be assigned as follows:

Weighted final score	Grade
94 – 100	4.0 / A
90 – 93	3.7 / A-
87 – 89	3.3 / B+
84 – 86	3.0 / B
80 – 83	2.7 / B-
77 – 79	2.3 / C+
74 – 76	2.0 / C
70 – 73	1.7 / C-
67 – 69	1.3 / D+
64 – 66	1.0 / D
0 – 63	0.0 / F

Magnetic resonance elastography images of the human brain. *Credit: Harvard Gazette*



A confocal microscope image showing serotonin neurons and cortical axons in the dorsal raphe nucleus. *Credit: M. Warden*

Course policies and expectations

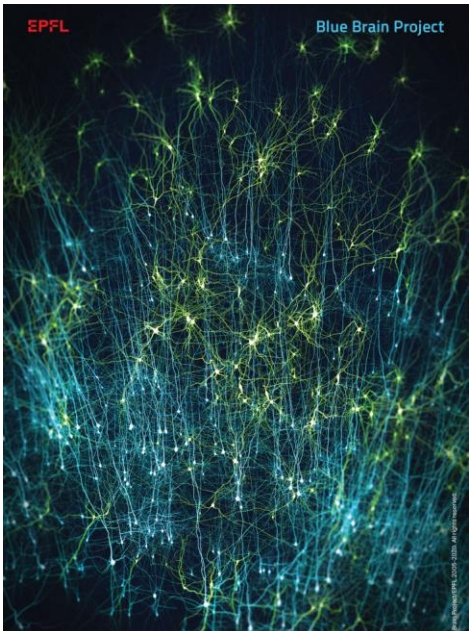
My promises to you. You will submit a good deal of written work in this course, and I intend to give meaningful, constructive feedback on all of it. I will do my best to comment on and grade your assignments within *three weekdays* of the due date, and return exams within *seven weekdays* of the exam date. As I am a part-time employee of Bryn Mawr and spend the majority of my time at the University of Pennsylvania, I am not routinely on campus outside of my scheduled class time; however, this does not mean that I am not accessible to you outside of these class times. I routinely monitor my email and will do my best to respond to all messages within one weekday of receiving them; responses on weekends may be slower. In addition to my scheduled office hours (one in-person and one via Zoom), I am happy to set up additional Zoom meetings at your request. I am also frequently on-campus over the weekends and could meet in person then.

My expectations of you. I ask that you show up to class with an open mind and a willingness to learn with your classmates. I use a partially flipped classroom, meaning that half of my lectures are uploaded online prior to class. *Please* watch all indicated lectures prior to our in-class meetings, as familiarity with that material will be essential for you to understand what we discuss in-person. A good deal of our in-class time will be spent in small group problem-solving and full-class discussion. Your active participation in each of these arenas is critical to facilitate a successful learning environment.

Peer review. The writing and scientific processes require that we seek and receive feedback on our work so that it can improve. While I will always provide feedback on your assignments, it's equally beneficial to get comments from your peers who are working on the same assignments. Therefore, please know that everything you write in this class may be read by others in the class. This collaborative writing process will be particularly important as you craft your final essay.

Attendance. Because active participation is key to a successful class, I do keep track of student attendance (this will be partially reflected in your *Participation* grade--see "Grades" section above). I fully understand that illness, religious holidays, and other life events may arise causing you to miss class. Please let me know if this is the case, and I will accommodate you. Especially as we continue to face waves of COVID-19 cases, it is important that you not come to class if you are feeling ill. If this is the case, please simply email me before class to let me know that you will not be coming. After class I will follow-up with any material that may help catch you up on what you missed. Repeated or unexplained absences will decrease your participation grade. If I am feeling ill and do not believe I should come to campus, I will alert you via Moodle and we will hold our class virtually.

Religious observance. The College and I respect students' religious commitments, and to that end students will not be penalized should they be unable to attend class or an exam due to a religious observance. Students who miss class or an exam due to a religious observance will be given an opportunity to make up missed work without penalty.



A digital reconstruction of mouse cortex, including pyramidal neurons and interneurons. *Credit: Blue Brain Project*

Accessibility and disability accommodations. I am happy to accommodate any student who has a learning or cognitive disability, a physical disability that makes it difficult for you to get across campus from class-to-class, or mental health issues such as anxiety and depression that impact your academic performance, or any other circumstance I've failed to mention. The Access Services office in Guild Hall provides support and reasonable accommodations for eligible students, employees, and guests with disabilities. If you think you may need academic accommodations for a disability, you can register with Access Services either by calling 610-526-7516 or by making an appointment with Deb Alder, the Director of Access Services, at dalder@brynmawr.edu to begin the confidential process. Once registered, you should schedule an appointment with me as early as possible so that appropriate arrangements can be made.

Title IX. Bryn Mawr is committed to fostering a safe and inclusive living and learning environment where all can feel secure and free from harassment. All forms of sexual misconduct, including sexual assault, sexual harassment, stalking, domestic violence, and dating violence are violations of Bryn Mawr's policies, whether they occur on or off campus. Bryn Mawr faculty are committed to helping to create a safe learning environment for all students and for the College community as a whole. If you have experienced any form of gender or sex-based discrimination, harassment, or violence, know that help and support are available. Staff members are trained to support students in navigating campus life, accessing health and counseling services, providing academic and housing accommodations, and more. The College strongly encourages all students to report any incidents of sexual misconduct. Please be aware that all Bryn Mawr employees (other than those designated as confidential resources such as counselors, clergy, and healthcare providers) are required to report information about such discrimination and harassment to the Bi-College Title IX Coordinator. Information about the College's Sexual Misconduct policy, reporting options, and a list of campus and local resources can be found on the College's website.

Academic support. Students are encouraged to reach out to the Office of Academic Support to explore effective learning, studying, and time and stress management strategies that are essential to success in this course and college life. Students can schedule a meeting with the Academic Support and Learning Resources Specialist by calling the Dean's Office at 610-526-5375.

Academic integrity. Students should become familiar with all College policies, particularly the honor code. Plagiarism is defined as the practice of taking someone else's work or ideas and passing them off as one's own. Because this is a mid-level course, I assume good will in all of my students and will work with you if your writing inadvertently approaches plagiarism. Cheating on exams and egregious instances of plagiarism could potentially result in failure of the course.

Disclaimer. Although it is unlikely, I reserve the right to change components of this syllabus. I will always notify you of changes, and will never make any assignment due dates or exam dates earlier than initially published.

Tentative Course Schedule

#	Date	Topic	Reading	Assignments Due
1	Tue. Jan. 18	Studying the brain and behavior	*Required*: Syllabus *Recommended*: Ch. 1	
2	Thu. Jan. 20	Neuroanatomy: Nervous system Reading a scientific paper	*Watch:* Pre-class video—Divisions of the nervous system *Recommended:* Ch. 2	Start of semester survey
3	Tue. Jan. 25	Neuroanatomy: Nervous system, *cont.* Journal Club: Koenigs et al. (2005)	*Required:* Koenigs et al. (2005). *Nature* *Recommended:* Ch. 2	Discussion question for journal club (no submission)
4	Thu. Jan. 27	Neuroanatomy: The neuron Neurophysiology: Action potential	*Watch:* Pre-class video—Cells of the nervous system *Recommended:* Ch. 3	Worksheet 1 (Neuroanatomy)
5	Tue. Feb. 1	Neurophysiology: Synapse	*Recommended:* Ch.4	
6	Thu. Feb. 3	Neurochemistry: Neurotransmitters and drugs	*Recommended:* Ch.4	Worksheet 2 (Neurophysiology)
7	Tue. Feb. 8	Neurochemistry: Hormones	*Recommended:* Ch. 5	Research paper proposal
8	Tue. Feb. 15	Neurochemistry, *cont.*	*Recommended:* Ch. 5	
9	Thu. Feb. 17	*Librarian visit* Beginning your research paper Reward and drug addiction	*Recommended:* Ch. 4	Worksheet 3 (Neurochemistry)
10	Tue. Feb. 22	**Exam 1 (Classes 1-8)**		
11	Thu. Feb. 24	Learning and memory: Neuroplasticity	*Recommended:* Ch. 17	
12	Tue. Mar. 1	Learning and memory: Engrams and encoding space	*Recommended:* Ch. 17	Worksheet 4 (Reward and neuroplasticity)

13	Thu. Mar. 3	Learning and memory, *cont.* Planning your research paper	*Recommended:* Ch. 17	Annotated bibliography
	Tue. Mar. 8	No class (Spring Break)		
	Thu. Mar. 10	No class (Spring Break)		
14	Tue. Mar. 15	Reproductive behavior	*Recommended:* Ch. 12	
15	Thu. Mar. 17	Parental behavior	*Recommended:* Ch. 12	Worksheet 5 (Memory)
16	Tue. Mar. 22	Energy homeostasis	*Recommended:* Ch. 13	Worksheet 6 (Sex and parenting)
17	Thu. Mar. 24	Circadian rhythm and sleep	*Recommended:* Ch. 14	
18	Tue. Mar. 29	**Exam 2 (Classes 9, 11-17)**		Worksheet 7 (Homeostasis)
19	Thu. Mar. 31	Attention and cognition	*Recommended:* Ch. 18	
20	Tue. Apr. 5	Social behavior and autism		Experiment proposal
21	Thu. Apr. 7	Emotion	*Recommended:* Ch. 15	Worksheet 8 (Attention and social behavior)
22	Tue. Apr. 12	Stress	*Recommended:* Ch. 15	
23	Thu. Apr. 14	Neurobiology of anxiety disorders	*Recommended:* Ch. 16	
24	Tue. Apr. 19	Neurobiology of mood disorders	*Recommended:* Ch. 16	Worksheet 9 (Stress and anxiety)
25	Thu. Apr. 21	Neurobiology of psychotic disorders	*Recommended:* Ch. 16	
26	Tue. Apr. 26	**Exam 3 (Classes 19-25)**		Worksheet 10 (Mood and psychotic disorders)
27	Thu. Apr. 28	Final essay peer review Course wrap-up		Final essay sample
	Tue. May 3	**Final essay due by 11:59pm[2]**		

Please note that this schedule is tentative and subject to change. An up-to-date schedule will be maintained on Moodle. I will give ample notice if any assignment due dates or exam dates are changed.

[1]Assignments will be due before the start of class, and therefore must be uploaded to Moodle by 8:20am (unless otherwise indicated on the assignment).

[2]If you require an extension due to other final exams or projects due around this time, please let me know well in advance and we can decide upon an appropriate extension.