

## Advanced Topics in Neuroscience: Neuroscience of Mood Disorders

PSYC B316-001, Fall 2022

Thu., 1:10-4:00 pm

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**Course description.** Approximately twenty percent of people will experience a mood disorder at some point in their lifetime, dealing with symptoms that can severely hinder their wellbeing. Despite the prevalence of mood disorders such as depression and the amount of research being done in this area, therapies remain somewhat limited, particularly for treatment-resistant depression. This seminar course will examine the neuroscience of these mood disorders with a particular focus on depression. The goal of this course is to explore the neurobiology underlying the development of mood disorders, pharmacological and non-pharmacological treatments for such disorders, and the animal models and conceptual frameworks that are being used to improve our understanding and treatment of mood disorders. We will investigate these topics using primary literature in both the clinical and basic science fields. The course format will blend journal club-style discussion, student presentations, and small group problem solving. Students will build the skills necessary to design experiments and critically evaluate scientific literature.

### Instructor

Ryan J. Post, Ph.D.

Visiting Assistant Professor, Bryn Mawr College, Psychology Dept.

Postdoctoral Fellow, University of Pennsylvania, Biology Dept.

*Please feel free to call me either “Ryan” or “Dr./Prof. Post,” whichever you are more comfortable with. My pronouns are he/him.*

### Contact

[rpost@brynmawr.edu](mailto:rpost@brynmawr.edu)

Office hours: Tue. 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 learn to *critically evaluate primary scientific literature* through:

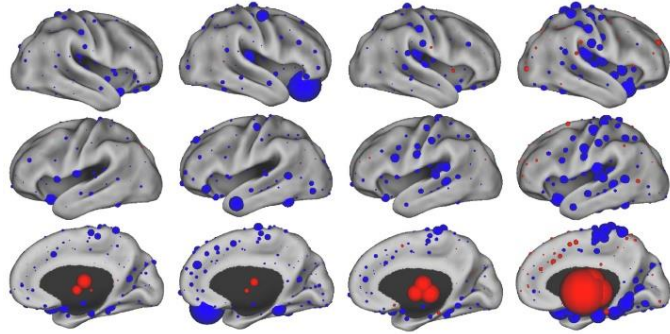
- Reading and crafting discussion questions for two journal articles per week.
- Leading the class in discussion of research related both to course content and their research project.
- Solving complex research-based problems in take-home exams.

Students will *develop their ability to craft and defend novel research proposals* by:

- Collaborating with classmates to identify unexplored directions in a field of research of their choice.
- Presenting a potential research program and initial experiments to their classmates.

- Writing an NIH-style grant proposal.

**Texts and required reading.** As this class will nearly exclusively draw from the primary literature, all required readings will be provided to you as PDFs posted to the course Moodle. There is no textbook for this course. When you are researching the literature to support your independent projects, note that *you should never need to pay for access to an article*. If an article is not immediately available to you, the library has mechanisms of retrieving it for you at no cost.



A representation of four different “biotypes” of depression (columns) that correspond with different depression symptom profiles. Credit: Drysdale et al. (2017)

### Course design and grading

As this is an Advanced Topics course, the focus both in course design and assessment is the critical evaluation and discussion of primary research in the field of mood disorders. As such, grading in this course emphasizes presentation and discussion of primary research, designing and presenting a research proposal in the field of mood disorders, and applying critical thinking and scientific reasoning skills to challenging questions in neuroscience.

Group research proposal (50%). Working throughout the semester in small groups of 3-4 students, you will research a specific subfield of neuroscience related to mood disorders that is of particular interest to your group. Multiple assignments will contribute to this 50% course total; full prompts for each assignment related to the group research proposal will be distributed as the semester progresses.

Project proposal (10%). Early in the semester, your group will submit a written proposal describing the scientific question related to mood disorders that you will research and propose a series of experiments to address. This proposal should explain the state of knowledge in regard to your question, the importance of continued research addressing this question, and a preliminary idea of the experiments you would propose to address this question.

Conference (10%). At least one week prior to presenting your proposal to the full class, your group will meet with me to evaluate your plan for the presentation, including your choice of article for group discussion.

In-class presentation (30%). Your group will present to the class for 60-75 minutes describing your scientific question, its importance, background literature on the state of knowledge, a journal-club style discussion of one paper relevant to your topic, and a description of experiments you would propose to advance knowledge in this area.

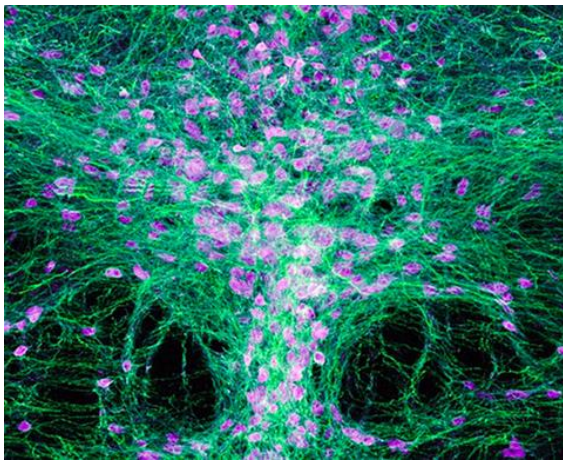
Written research proposal (50%). In lieu of a final exam, your group will submit a written research proposal loosely in the style of an NIH grant. Your proposal will include an executive summary, a section describing the background literature related to your

proposal, the significance of your proposed research, a detailed description of the experiments you would propose, and a description of the methods you will use.

Take-home exams (20%). Two take-home exams will be assigned throughout the semester. The exams will be exercises in scientific problem-solving, asking you to do background research and propose experiments that would address unanswered questions in the field of neuroscience related to mood disorders. While you may collaborate with each other as you work through the exams, you must submit your own, independently written exam. While I can answer clarifying questions regarding the exams, I won't address specific questions about the content of the exam. Take-home exam deadlines are set to five minutes before class starts on their due dates. I acknowledge that 1:00pm is a strange deadline—I set exam deadlines prior to the start of class so that you are not distracted working on the exam while we are having a discussion or your classmates are presenting.

Journal article discussion leading (20%). Working with your small group, you will on two different occasions lead the class in discussing a journal article that relate to the week's theme. I will choose the article well in advance, though groups may suggest a replacement. While all students are expected to read the article in advance of class, the leading group will be responsible for structuring a sequence of discussion questions and designing exercises that actively engage their classmates. You and your group members are required to set up a meeting with me at least three days before the class period in which you will lead discussion so that we can review your plan.

Class discussion, preparation, and participation (10%). As the success of this seminar requires the active participation of all students, you will be required to submit at least one discussion question based upon the assigned reading. So that the group leading the discussion can adequately prepare, discussion questions must be posted to Moodle by the Tuesday night before class. In class, you are expected to be actively engaged, participating in the day's discussion. I monitor attendance, and unexcused absences from class will be reflected in your participation grade.



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

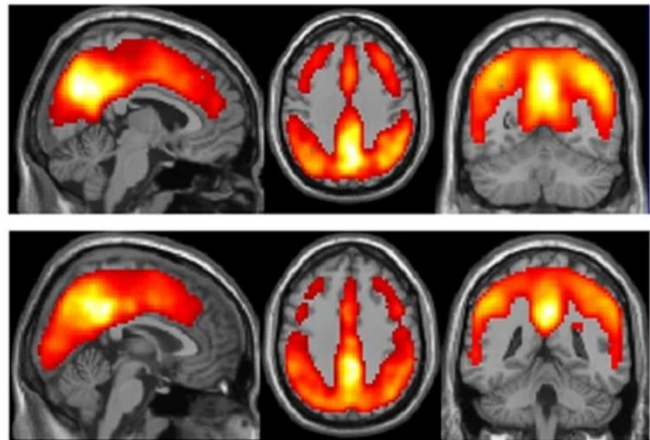
Regrade requests. If you wish to dispute the way an exam question, presentation, essay, or participation was graded, please submit a written explanation of your dispute via email. You have *one week* following the return of your exam, presentation rubric, etc. to make such a dispute. If you believe that an arithmetic mistake was made in tallying the points on your exam or rubric, but you do not wish to dispute the grading of any individual question, you may bring me the exam or rubric to me 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*. Extension requests made after the deadline will not be granted.

Determination of final grade. An average grade out of 100% will be calculated for each of the above sections (Research Proposal, Exams, etc.). The final score out of 100 will be calculated according to the weights listed: Group research proposal (50%), Take home exams (20%), Journal article discussion leading (20%), and Class discussion and participation (10%). 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



A depiction of **local temporal synchronization** of neural activity in a person with depression (top) and a healthy control (bottom), as measured by functional magnetic resonance imaging (fMRI). Credit: Yoshino et al. (2017)

**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, I am happy to set up additional Zoom meetings at your request.

My expectations of you. I ask that you show up to class with an open mind and a willingness to learn with your classmates. As this is a discussion-based seminar class, it is essential that you have actively read the assigned material. For us to create a successful learning environment together, all students will need to contribute to the discussion. If disagreements arise when discussing the material, we must be respectful of each other’s thoughtful opinions. Finally, much of our class time will be student-led. I ask that when it is your group’s turn to present or lead the class in discussion you adequately prepare so that you can foster a fruitful learning experience for your peers.

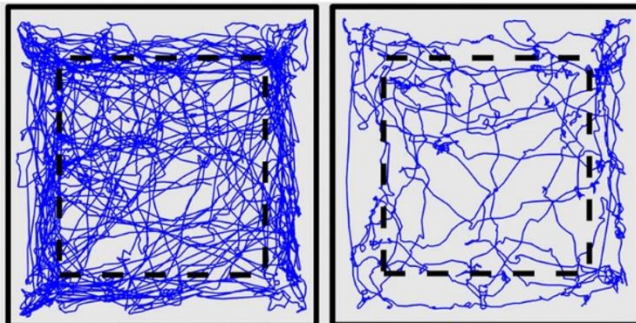
Group work. A good amount of work in this class will be done in small groups. Out of respect for your group members, everyone should contribute equally to the shared work and not burden some group members with substantially more responsibility. If disagreements arise within your group, I ask that you first try to resolve them amongst yourselves. If a group discussion does not resolve the issue, you may come to me with any concerns about how your group is functioning.

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 research proposal.

Attendance. Because active participation is key to a successful class, I do keep track of student attendance (this will be partially reflected in your *Class discussion, Preparation, and 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. If you are ill, 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.

COVID-19 and mask policy. In accordance with the College’s mask-friendly policy, I have decided to tentatively make masks *optional* in our class. I will distribute a poll after the first class to solicit your opinions regarding masking; if a substantial number of you would feel more comfortable with a mask-mandatory policy, then I will shift the policy to accommodate you.

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 due to a religious observance. Students who miss class due to a religious observance will be given an opportunity to make up missed work without penalty.



Mouse behavioral trajectories in the open field test in control mice (left) and mice exposed to a chronic stress paradigm designed to induce depression-like behavior. Credit: Zhang, Li, & Han (2020)

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 to get across campus from class-to-class, or mental health issues such as anxiety and depression that impact 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](mailto: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 an optional, upper-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 earlier than initially published.

### Tentative Course Schedule

#	Date	Topic	Reading	Assignments Due <sup>1</sup>
1	Thu. Sep. 1	Studying depression and reading neurobiology literature	<i>Required:</i> Syllabus	
2	Thu. Sep. 8	Dopamine and anhedonia	<i>Required:</i> Tye et al. (2013), Howe et al. (2013)	Discussion question(s) for Tye

				et al. (2013) or Howe et al. (2013) Group preferences for journal article discussion
3	Thu. Sep. 15	The medial prefrontal cortex and motivation	<i>Required:</i> Warden et al. (2012), Zhou et al. (2017), Sasaki et al. (2017)	Discussion question(s) for Warden et al. (2012) or Zhou et al. (2017)
4	Thu. Sep. 22	The lateral habenula, motivation, and reward	<i>Required:</i> Proulx et al. (2018), <sup>2</sup> Shabel et al. (2019), <sup>2</sup> Sartorius et al. (2010) <i>Recommended:</i> Sartorius & Henn (2007), Proulx, Hikosaka, & Malinow (2014)	Discussion question(s) for Proulx et al. (2018) or Shabel et al. (2019) Group research project proposal
5	Thu. Sep. 29	Serotonin and SSRIs	<i>Required:</i> Santarelli et al. (2003), <sup>2</sup> Capitão et al. (2015) <sup>2</sup>	Discussion question(s) for Santarelli et al. (2003) or Capitão et al. (2015)
6	Thu. Oct. 6	Ketamine	<i>Required:</i> Moda-Sava et al. (2019), <sup>2</sup> Klein et al. (2020) <sup>2</sup> <i>Recommended:</i> Jelen & Stone (2021)	Discussion question(s) for Moda-Sava et al. (2019) or Klein et al. (2020) Take-home exam 1
	Oct. 10-14	<b>Fall Break (No class)</b>		
7	Thu. Oct. 20	Stress and depression	<i>Required:</i> Amat et al. (2005), <sup>2</sup> Lemos et al. (2012) <sup>2</sup>	Discussion question(s) for Amat et al. (2005) or Lemos et al. (2012)
8	Thu. Oct. 27	Individual variation: resilience and susceptibility	<i>Required:</i> Chaudhury et al. (2013), <sup>2</sup> Isingrini et al. (2016) <sup>2</sup>	Discussion question(s) for Chaudhury et al. (2013) or Isingrini et al. (2016)
9	Thu. Nov. 3	Deep brain stimulation	<i>Required:</i> Mayberg et al. (2005), <sup>2</sup> Hamani et al. (2010), <sup>2*</sup> and Hamani et al. (2012) <sup>2*</sup>	Discussion question(s) for Mayberg et al. (2005), Hamani et al. (2010), or Hamani et al. (2012)

			<i>Recommended:</i> Veerakumar & Berton (2015)	
10	Thu. Nov. 10	Heterogeneity of depression	<i>Required:</i> Lamers et al. (2013), <sup>2</sup> Drysdale et al. (2017) <sup>2</sup> <i>Recommended:</i> Lee & Kim (2015)	Discussion question(s) for Lamers et al. (2013) or Drysdale et al. (2017) Take-home exam 2
11	Thu. Nov. 17	Group 1 research proposal Group 2 research proposal	<i>Required:</i> Group 1's journal article <i>Required:</i> Group 2's journal article	Discussion question for Group 1's journal article Discussion question for Group 2's journal article
	Nov. 24-25	<b>Thanksgiving Break (No class)</b>		
12	Thu. Dec. 1	Group 3 research proposal Group 4 research proposal	<i>Required:</i> Group 3's journal article <i>Required:</i> Group 4's journal article	Discussion question for Group 3's journal article Discussion question for Group 4's journal article
13	Thu. Dec. 8	Group 5 research proposal Group 6 research proposal	<i>Required:</i> Group 5's journal article <i>Required:</i> Group 6's journal article	Discussion question for Group 5's journal article Discussion question for Group 6's journal article
	<i>Dec. 11-16</i>	<i>Exam period.</i> Group research proposal due Wed. Dec. 14, 11:59pm <sup>3</sup>		

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.

<sup>1</sup>Discussion questions are due to the appropriate Moodle discussion board by the Tuesday night before class so that the group leading discussion can adequately prepare. Take-home exams and other assignments are due before the start of class, and therefore must be uploaded to Moodle by Thursday at 1:00pm (unless otherwise indicated on the assignment).

<sup>2</sup>The discussion of this journal article has the option to be student-led. Please refer to the student-led discussion calendar on Moodle.

<sup>2</sup>If chosen as a student-led discussion, these two (short) papers must be presented together.

<sup>3</sup>If you require an extension due to other final exams or projects due this day, please let me know *well in advance* and we can decide upon an appropriate extension.