

PSY-341: Laboratory in Behavioral Neuroscience

Course Syllabus
Spring 2022



Course Information:

Tuesdays and Thursdays, 9:30-10:50 AM ET | Mars Science Center 1145

Thursdays, 2:00-5:00 PM ET | Mars Science Center 1145

Course website: <http://OnCourse.wheatoncollege.edu/>

You will be asked to login using your Wheaton ID number and password (the same password you use for Wheaton email). Once logged in, you should be taken to a page of links for all courses in which you are enrolled that have onCourse sites. It is expected that you check our course website at least once per week.

Contact Information:

Instructor: Christina J. Reppucci, PhD

Email: reppucci_christina@wheatoncollege.edu

Physical Office: Mars Science Center 1131

Virtual Office: Zoom Meeting ID: [949 4688 3648](#) | Passcode: brains

Office Hours: [Tuesdays & Wednesdays 4:00PM – 5:30PM](#). These times are specifically set aside to answer your questions. You may drop-in or you can sign-up for slots using the link above if you'd like to meet in-person, but please use the sign-up if you'd like to meet virtually. You are encouraged to block multiple consecutive time slots if needed. Scheduling conflict? Please email me to request other appointment times.

Note: appointments outside of these office hours must be scheduled **at least 24h in advance**.

When emailing me, please include the course code (PSY-341) in the subject line so that the email can be easily identified and **allow at least 24h for a reply**. This means that if you have questions on material before a deadline, emailing the day/night before may not get you answers in time.

IT Support Services: Email: support@wheatoncollege.edu | Submit a Service Request: [ITSS Help Desk](#)

Recommended Texts: Guide to Research Techniques in Neuroscience | 2nd ed | Carter & Shieh
ISBN: 978-0-12-800511-8 | eBook is available for free via Wheaton College Library

Writing Papers in the Biological Sciences | any edition | Victoria E. McMillian
We won't be referencing this text directly, but it's a helpful guide for any course where you having writing assignments (I still refer to my copy from undergrad!).

Access to additional readings, short videos, handouts, PowerPoint lectures, etc. will be made available via the class onCourse site.

Course Description & Objectives:

This course will provide an overview of experimental techniques used in **behavioral neuroscience**, from the classic to the cutting edge, with a focus on rodent models. The theories and principles behind each technique will be discussed, and primary research articles that utilized these techniques will be critiqued. This course will include hands-on laboratory learning, wherein students will gain experience in techniques such as behavioral assessments, intracranial surgery, tissue processing and staining, neuroanatomical identification, and microscopy. Students will learn how to pose and test behavioral neuroscience research questions, analyze behavioral and neuroanatomical data, and write research papers in APA format.

The main objectives of this course are to:

1. Describe the diverse nature of the field of behavioral neuroscience.
2. Describe the significance of the use of rodent models in behavioral neuroscience research.
3. Learn how to read and critically evaluate scientific literature, including primary research articles.
4. Learn how to pose and test behavioral neuroscience research questions, analyze behavioral and neuroanatomical data, and write research papers in APA format.

RESPECT. A successful learning experience requires mutual respect on behalf of the student and the instructor at every level. We should value one another and be open to diverse perspectives. Students are expected to always show courtesy, civility, and respect for one another and for the instructor. Comments that degrade or ridicule another are unacceptable.

We are a TEAM. I hope that we will work together throughout the semester to learn from each other. I will do my best to provide resources and tailor the course material to fit your interests, but I also ask for you to actively participate in our goal of sharing knowledge! It can be in the form of current news/new discoveries, interesting studies, questions, etc. If you are having difficulties with understanding the material in class, please speak up— your fellow classmates may have the same question! If you are not comfortable asking during class, please come to office hours!

Readings and Lab Preparation:

You are expected to read all assigned pages, articles, lab protocols, etc. prior to coming to class. This is particularly important as doing so will help strengthen your understanding of the material we cover when we meet, help facilitate our in-class discussions, and allow us to make the most efficient use of our time during laboratory exercises. Supplemental readings may also be provided.

Course Workload Expectations: At Wheaton College, students are expected to spend approximately 3 hours of class time and 9 hours of out-of-class academic activity for each course/credit.

Grading:

Grading is non-competitive, and students are encouraged to study & discuss materials together. However, unless explicitly stated otherwise in an assignment, any work turned in must be yours and yours alone.

Evaluation	Percentage
Attendance & Participation	10%
Journal Club Presentation & Discussion Leading	10%
Literature Review	10%
Novel Experiment Paper + Presentation	20%
Laboratory Assignments/Activities	30%
Research Poster & Presentation	10%
Miscellaneous Assignments	10%
<i>Total</i>	<i>100%</i>

Course final grades will be assigned on the total percentage earned during the course as follows:

> 98% = A+	87-89% = B+	77-79% = C+	67-69% = D+	< 59% = F
94-97% = A	83-86% = B	73-76% = C	63-66% = D	
90-93% = A-	80-82% = B-	70-72% = C-	60-62% = D-	

What's in a grade?

- **“A”** Work = Work that is consistently of high standard, and shows distinction in qualities such as organization, accuracy, originality, conciseness, understanding, and insight. **“A”** work also clearly demonstrates an ability to pull from multiple sources and draw connections between different courses.
- **“B”** Work = Work that is consistently above average. **“B”** work demonstrates evidence of attention to detail, organization, creativity, and the ability to transfer principles from this course to other situations.
- **“C”** Work = Work that completes the minimum requirements and is satisfactory. **“C”** work is organized and accurate, but does not go beyond essential facts.
- **“D”** Work = Work that falls below the acceptable standard. **“D”** work shows a lack of attention to detail and organization, inaccuracies, and less than minimum effort.
- **“F”** Work = Work that is unsatisfactory or incomplete.

Attendance & Participation (10%)

Attendance and participation are **critical** for this course. You are responsible for reading all preparatory materials and coming class lab ready to discuss and do neuroscience! Documentation/communication is required for an excused absence (i.e. student advisor's note, doctor's note, Dean's note, etc.). It is expected that you actively participate-- I have found this to be a great way to engage you in learning the material, and it makes the course more fun! *You are responsible for any course information or materials you miss.*

Journal Club Presentation & Discussion Leading (10%)

Working in pairs, students will be responsible for the in-class presentation and discussion of a primary journal article. This article must utilize one of the methods that was introduced during the previous class. No more than half of this ~30min presentation should be reviewing the article; a majority of the time should be spent leading a class discussion about the methods the authors used (e.g. Why was this method used? Did the method sufficiently answer the posed question? Would another method be able to answer the question? What would a follow-up experiment look-like?). Articles must be approved at least 1 week in advance* of the presentation (so they may be posted on OnCourse), and students are encouraged to attend office hours to discuss their presentation and ideas for leading the discussion.

Literature Review (10%)

Each student will write a literature review on a topic of their choosing. The literature review can be on any behavioral neuroscience topic you find interesting-- it can be related to one of the experiments we will be doing this semester, or something completely different. This review should be 4-6 pages long, and cite ≥10 primary sources (reviews may be cited, but will not count toward this total). These papers will be returned with comments, and then used for the Introduction section of the Novel Experiment Paper. Literature review topics must be approved in advance*, and students are encouraged to attend office hours to discuss their ideas.

Novel Experiment Paper & Presentation (20%)

In the novel experiment paper, students will expand upon their literature review and propose a hypothesis and novel experiment that would add to the field. This 10-15 page paper will be structured similar to a journal article with Introduction, Methods, and Discussion sections. Hypotheses must be approved in advance *, and students are encouraged to attend offices hours to discuss their ideas. Each student will give a ~15 min in-class presentation about their paper (10 min talk + 5min for questions; worth 10% of this assignment's grade).

Laboratory Assignments/Activities (30%):

A handout, Results section-like write-up, and/or other assignment will accompany each laboratory exercise.

Research Poster & Presentation (10%)

Students will work in small groups to create a research poster based on one of the three behavioral experiments conducted during the semester. Posters will then be presented during the end-of-semester Psychology Department Symposium.

Miscellaneous Assignments (10%):

Periodically throughout the semester you may be asked to complete various small assignments (e.g., quizzes, short writing assignments, worksheets, discussion forums). All assignments will be completed or announced in class, but it is your responsibility to check OnCourse for new assignments and turn the work in on time.

**Failure to pick a paper 1 week in advance or turn in your topic/hypothesis by the deadline will reduce that assignment's grade by 3% (~1 grade partial; A → A-, A- → B+, etc.).*

All written work should follow APA style. The following are useful guides for APA style and scientific writing:

- <http://www.apastyle.org/> and/or the Publication Manual of the American Psychological Association
- <https://library.wheatoncollege.edu/psy/guide> or <https://library.wheatoncollege.edu/neur/guide>
- <http://www.nature.com/scitable/topicpage/effective-writing-13815989>
- Victoria E. McMillan's: Writing papers in the biological sciences (any edition)

Have questions about finding resources, articles, citation managers, etc?

- Chat with a librarian (M-F, 9:30am-4:30pm): <https://library.wheatoncollege.edu/chat>

Late/Make-Up Assignments:

The goal of work assigned in- and out-side of class is to help you learn the material and develop a deeper appreciation and understanding of the course topics and themes, thus you will receive the greatest learning benefit when work is completed by the given deadlines (as stated in class and/or posted on the OnCourse site). However, late/make-up **will be accepted** – no justifications required. Items submitted within 2 weeks (14 days) of the deadline can earn **90% credit**, and items submitted before 11:59pm on May 8th may earn up to **75% credit**. The late penalty will be waived in the case of **prior notice** of a verifiable and documented emergency, but [especially given our current circumstances] we may be able to work something out if you get in touch with me **as soon as possible** if you are in a difficult situation. Late/make-up work will not be accepted after May 8th, at which time any outstanding assignments **will be marked as a 0**.

Extra Credit:

Extra credit cannot be requested on an individual basis. However, throughout the semester you will be given the option to do an additional short assignment. For example, the assignment may ask you to attend a talk or to do some research and write a brief report on what you heard/discover. These specific assignments will be optional only, and are used as a way to broaden your knowledge and obtain extra credit. These extra credit opportunities will be worth a varying number points and added to your final course grade. Assignments will be graded as to their thoughtfulness and accuracy, not just completion. *Extra credit cannot raise your final grade more than 1/3 of a step (for example, more than from a C+ to a B-), no matter how many points you earn.*

Honor Code:

As a student at Wheaton College, you are trusted by your professors and fellow students to be honest in your academic undertakings. **Instances of academic dishonesty, including cheating or [plagiarism](#), will be taken seriously.**

As per the faculty resolution in 2003, course work must include the following statement with a signature:

"I have abided by the Wheaton College Honor Code in this work."

The full Wheaton College Honor Code is as follows:

As members of the Wheaton community, we commit ourselves to act honestly, responsibly, and above all, with honor and integrity in all areas of campus life. We are accountable for all that we say and write. We are responsible for the academic integrity of our work. We pledge that we will not misrepresent our work nor give or receive unauthorized aid. We commit ourselves to behave in a manner which demonstrates concern for the personal dignity, rights and freedoms of all members of the community. We are respectful of college property and the property of others. We will not tolerate a lack of respect for these values. I accept responsibility to maintain the Honor Code at all times.

Your signature along with the statement indicated in bold italics above states your compliance with the Wheaton Honor Code. **Violations of the Honor Code will not be tolerated.** Materials submitted that are deemed violate the Honor Code will receive a zero. Additional violations could result in a grade of "F" for the course. If you have any doubts about what you are writing and whether or not it constitutes plagiarism, please consult with me before you turn in that work.

Accessibility Statement:

Wheaton is committed to ensuring equitable access to programs and services and to prohibit discrimination in the recruitment, admission, and education of students with disabilities. Individuals with disabilities requiring accommodations or information on accessibility should contact Autumn Grant, Associate Director for Accessibility Services at the Filene Center for Academic Advising and Career Services at accessibility@wheatoncollege.edu or 508-286-8215.

I am happy to support and accommodate students with disabilities and/or learning differences. However, documentation should be provided as soon as possible and accommodations should be negotiated no later than the first full week of classes. The student will also be responsible for informing me of the required accommodations at least one week in advance of each exam.

Wheaton Student Support & Wellness Resources:

Your overall wellness is important and it contributes to your academic success. I want to make sure that you have information regarding resources at your disposal, and I highly encourage you to utilize these resources.

- [The Counseling Center](#) is the confidential and FREE mental health resource on campus for all students and will be offering in person and telehealth care this year. To learn about services, check out the [website](#), or give the office a call at 508-286-3905. Additionally, the *Mental Health Support Line* is available anytime the CC is not, by calling the front desk 508-286-3905 and following voicemail prompts to be connected to a clinician (24/7, available in languages other than English, and accessible from anywhere you are in the world).
- [The Filene Center](#) strives to support your learning pathway by fostering successful academic, career, and personal development. The academic advising staff will work collaboratively with you, faculty and campus resources to ensure that you have the access and guidance to become a confident and reflective learner at Wheaton and beyond. Contact us at advising@wheatoncollege.edu.
- Many other offices on campus can also help support the holistic wellness of students. For students who identify as low-income, first-gen, LGBTQ+, or have a faith or spiritual practice they adhere to, the [Center for Social Justice and Community Impact](#) and [Center for Religious and Spiritual Life](#) (the Base) are good places for support and engagement. The [Marshall Center for Intercultural Learning](#) supports BIPOC students and those working towards breaking down barriers across differences, and the [Center for Global Education](#) supports international students, and students seeking educational opportunities abroad. The [SMART](#) and [Title IX Office](#) support students through sexual and gender based misconduct, and the [Bias Incident Response Team](#) supports individuals through a wide variety of bias events. We encourage you to reach out to any and all of these offices for support.
- [Health Services](#) through Norton Medical Center is available to support students with a variety of physical health needs including specialty support for GYN and STI care. Contact the office at 508-286-4500 to make an appointment for care. There is no copay for visits and most services are free, with select procedures and labs billed to insurance.

Personal Electronic Devices & Technology in the Classroom:

Please place your phones and any other devices on mute or vibrate before you come to class. There will be opportunities for interactive responses to questions during lectures using your internet-capable devices (smartphone, laptop, or tablet), and you may use laptops or tablets in class to consult readings or to take notes. However, any other use of your electronic devices is prohibited (e.g., checking email or social media, web-surfing, texting, for the purposes of academic dishonesty/violations of the Honor Code, etc.)— it's distracting to your own learning and to the learning of those around you. If you are unable to stay on-task or are otherwise distracted by your smartphone/laptop/tablet, I will ask that you put the device(s) away.

Instructor Recordings of Class Sessions:

The instructor may record any or all portions of class meetings for educational purposes. A recording is defined as any video or audio replication or photographic image recorded on any device that can record images and/or sound. At the discretion of the instructor, the recordings may be shared only with students enrolled in the course and will be deleted at the conclusion of the course. In these circumstances, all students participating in the course as well as any guest speakers will be informed that recording may occur. Students may not reproduce, post, or distribute any recordings provided by the instructor.

Student Recording of Class Sessions:

Students may not record (as defined above) or transmit activities (e.g., lectures, discussions) that occur as part of a classroom session unless: (1) Accessibility Services has authorized recording as an academic accommodation for a qualified student with a disability and the student has notified the instructor of that authorization by presenting their accommodation letter; or (2) permission from the course instructor has otherwise been granted. In these circumstances, all students participating in the course as well as any guest speakers will be informed that audio/video recording may occur. If a student is given authorization to record any portion of a classroom session, that student understands and agrees that the recording is for the sole use of the individual student and may not be reproduced, sold, posted on social media/online, or otherwise distributed as this would infringe on the privacy rights of others represented in the recording.

SEMESTER SCHEDULE

WEEK 1		
DATE	9:30-10:50 AM	2:00-5:00 PM
Thurs 01/27	Lecture 1: Introduction to Course	Asynchronous: Complete CITI Training
WEEK 2		
Tues 02/01	Lecture 2: Research Methods Basics	
Thurs 02/03	Lecture 3: Observing Behavior	Lab Exercise 1: Behavioral Scoring
WEEK 3		
Tues 02/08	Lecture 4: Surgery & Tissue Acquisition 1	
Thurs 02/10	Lecture 5: Surgery & Tissue Acquisition 2 In-Class Exercise: Using a Brain Atlas	Lab Exercise 2: Sheep Brain Dissections
WEEK 4		
Tues 02/15	In-Class Exercise: Finding & Citing References	
Thurs 02/17	Lecture 7: Neurochemical Methods 1 – Basics, Immunohistochemistry, and <i>In Situ</i> Hybridization	Lab Exercise 3: Mounting & Staining Tissue
WEEK 5		
Tues 02/22	Lecture 8: Neurochemical Methods 2 – Autoradiography Mini-Lab Exercise: Receptor Autoradiography Analysis	
Thurs 02/24	Student Journal Club Presentation 1: Autoradiography Lecture 9: Neurochemical Methods 3 – Microdialysis	Lab Exercise 4: Basic Microscopy
WEEK 6		
Tues 03/01	Student Journal Club Presentation 2: Microdialysis Lecture 10: Mapping Neural Pathways	
Thurs 03/03	Student Journal Club Presentation 3: Anterograde or Retrograde Tracing In-Class Exercise: Mapping Neural Pathways	Lab Exercise 5: Image Analysis
WEEK 7		
Tues 03/08	Lecture 11: Assessing Neural Activity – Immediate Early Genes	
Thurs 03/10	Student Journal Club Presentation 4: Fos Lecture 12: Recording Neural Activity – Electrophysiology	Lab Exercise 6: Basics of Working with Rats & Estrous Phase Detection
WEEK 8		
Tues 03/15	Spring Break – No Class!	
Thurs 03/17	Spring Break – No Class!	
WEEK 9		
Tues 03/22	Student Journal Club Presentation 5: Electrophysiology Lecture 13: Disrupting Neural Activity	
Thurs 03/24	Student Journal Club Presentation 6: Lesions Class Discussion: Prep for Behavioral Experiment 1	Lab Exercise 7: Behavioral Experiment 1

WEEK 10		
Tues 03/29	In-Class Exercise: Scoring Videos from Experiment 1	
Thurs 03/31	Class Discussion: Prep for Behavioral Experiment 2	Lab Exercise 8: Behavioral Experiment 2
WEEK 11		
Tues 04/05	In-Class Exercise: Scoring Videos from Experiment 2	
Thurs 04/07	Class Discussion: Prep for Behavioral Experiment 3	Lab Exercise 9: Behavioral Experiment 3, part 1
WEEK 12		
Tues 04/12	Lecture 14: Stimulating Neural Activity	
Thurs 04/14	Lecture 15 & In-Class Exercise: Psychopharmacological Manipulations	Lab Exercise 10: Behavioral Experiment 3, part 2
WEEK 13		
Tues 04/19	In-Class Exercise: Scoring Videos from Experiment 3	
Thurs 04/21	Class Discussion: Data Visualization	Surgery Demos
WEEK 14		
Tues 04/26	Lecture 16: Optogenetics & DREADDs 1	
Thurs 04/28	Lecture 17: Optogenetics & DREADDs 2	Work on Posters
WEEK 15		
Tues 05/03	In-Class Exercise: Practice Poster Presentations	
Thurs 05/05	In-Class Exercise: Peer Editing/Paper Conferencing for Novel Experiment Papers	Novel Experiment Paper Presentations!
FINALS WEEK		
Fri 05/14 2:00PM AM	FINAL NOVEL EXPERIMENT PAPER DUE by 11:59PM, 05/14	

A more detailed version of the semester schedule will be maintained on the onCourse class website.

Please note: This syllabus and the semester schedule are subject to change 1) in the event of unforeseen circumstances, 2) according to class interest and time, or 3) as deemed necessary by the instructor. Any changes will be announced in class and posted on the OnCourse site.

Behavioral Neuroscience Laboratory Exercises:

Lab Exercise 1 (Behavioral Scoring): In this lab, you will gain experience in the manual scoring of rat behavior. This is a critical component of *behavioral* neuroscience research, and will be an important component of the three behavioral experiments you will conduct late in the semester.

Lab Exercise 2 (Sheep Brain Dissections): This lab is intended to familiarize you with the structures of the mammalian brain. You will learn to identify the major structures and landmarks of the sheep brain. You will also compare the sheep, human, and rat brains to develop your understanding of comparative neuroanatomy.

Lab Exercise 3 (Mounting & Staining Tissue): In this lab, you will gain experience working with rat brain tissue including mounting slices of brain tissue onto microscope slides and performing basic cytological stains.

Lab Exercise 4 (Basic Microscopy): In this lab, you will learn how to use a basic light microscope, which is an important skill in neuroscience research. In addition, you will further develop your understanding of the neuroanatomy of the rat brain and take photomicrographs of stained rat brains.

Lab Exercise 5 (Image Analysis): In this lab, you will gain experience in manual and/or semi-manual analysis methods for analyzing photomicrographs of stained rat brains.

Lab Exercise 6 (Basics of Working with Rats & Estrous Phase Detection): In this lab, you will gain experience and confidence in working with rats. You will be instructed in the basic handling of laboratory rats, and loose vaginal epithelial cells will be collected from the female rats to identify estrous phase and the associated hormonal status. You will do cytological staining and practice identifying the estrous phase stages.

Lab Exercise 7 (Behavioral Experiment 1): In this lab, you will conduct a behavioral experiment assessing the effects of caffeine on behavior in the open-field test.

Lab Exercise 8 (Behavioral Experiment 2): In this lab, you will conduct a behavioral experiment assessing the effects of caffeine on behavior in the elevated plus maze.

Lab Exercises 9 & 10 (Behavioral Experiment 3): In this lab, you will conduct a behavioral experiment assessing the effects of NMDA receptor antagonism on novel object recognition.

Food and drink are not permitted at your workstations in Mars Science Center 1145 or in the animal facility. You may step outside as needed to have a drink of water.

**The dress code for Mars Science Center 1145 and for working with animals is:
long pants and closed-toe shoes.**

During most labs, hair must be tied/clipped back.

--- Please plan accordingly ---

Additionally, please refrain from wearing strong fragrances on days we will be working with the rats.

****There is absolutely NO photography or videos to be taken during live lab procedures. Non-compliance may be a violation of IACUC policies and lead to disciplinary action.****