

PSYC*4470, Course Outline: Fall 2025

General Information

Course Title: PSYC*4470 – Advanced Topics in Behavioural and Cognitive Neuroscience

Course Description:

This course will consider some of the many exciting avenues of research being explored in the field of modern behavioural and cognitive neuroscience, with a strong emphasis on the neurobiological bases of learning and memory. We will take an integrative approach by considering the anatomical, cellular, and molecular substrates of memory acquisition, consolidation, persistence, and retrieval in the context of a variety of “model systems”.

Seminar presentation and discussion format will be emphasized for much of the course. Students will each deliver one PowerPoint presentation based on a journal article of their choice in the second half of the semester. The first half of the semester will consist of lectures covering basic concepts and findings pertaining to the neurobiology of learning and memory. This will ensure that everyone has a common background in the topics to be considered throughout the remainder of the course.

There will be several student presentations (15 min, plus 5 min questions/discussion each) per seminar in the second half of the course. Ideally, all students will read the papers being presented on the day. This will enable you to follow the presentations more easily and contribute to class discussion.

ATTENDANCE AT ALL CLASS MEETINGS IS STRONGLY ENCOURAGED Attendance during the first few weeks of classes is absolutely essential. These are the meetings during which presentation topics and dates will be reviewed and assigned.

Some courses continue to be offered virtually and some face-to-face. **This course is being offered Face-to-Face: the course has a set day, time, and location of class. However, I will also livestream (see ZOOM links in CourseLink) and record all lectures and presentations.** For missed classes (e.g., due to illness, the requirement to self-isolate, work, etc.), students are expected to take their own steps, such as arranging with other students to catch up on missed materials. A discussion board is available on CourseLink for students to share lecture notes, and specific questions about missed material can be emailed to the instructor or TA. For missed exams and assignments, detailed policies are listed below in the Course Policies section.

[Accessibility-related requests for accommodation should follow standard university procedures](#), and all other requests should follow [standard academic consideration policy and procedures](#).

The success of this course depends to a large extent on your participation. Your involvement in class discussions will contribute to the quality of the course.

Credit Weight: 0.5

Academic Department (or campus): Psychology

Semester Offering: F25

Class Schedule and Location: Wednesdays, 8:30-11:20AM; MCKN 226

Instructor Information

Instructor Name: Dr. Boyer Winters

Instructor Email: bwinters@uoguelph.ca

Office location and office hours: MacKinnon Extension, Room 3005; ext. 52163; Meeting by arrangement; e-mail at all times

GTA Information

GTA Name: Katherine Andrews

GTA Email: kandre09@uoguelph.ca

GTA office location and office hours: TBA

Course Content

Specific Learning Outcomes:

By the end of this course, successful students should be able to:

1. Engage critically with scientific studies in the field of the neurobiology of learning and memory, demonstrating this skill through:
 - a. A student-led seminar in which they clearly present the rationale, methods/results, and interpretations of a published article, providing their own critical evaluation of these components.
 - b. Flexible thinking about the presented article in a 5-min question and answer period following the seminar presentation.
2. Demonstrate critical and creative scientific writing skills by integrating insight acquired from thorough readings of the literature and the above seminar experience to produce a research proposal. Students will design a novel scientific experiment to address an outstanding question in the field of neurobiology of learning and memory, providing clear experimental design and analysis details, as well as a review of pertinent background literature.

3. Explain, with the use of relevant empirical data, various learning and memory concepts and their putative neurobiological bases (e.g., memory consolidation).
4. Describe and critically evaluate different methodological approaches to the study of the neurobiology of learning and memory.
5. Demonstrate refined presentation skills resulting from observation and administration of PowerPoint seminars.

Lecture/Seminar Schedule:

Sept 10 – Introduction and organizational discussion, followed by start of Making Memories I: Conceptual Issues and Methodologies (Rudy Text Ch 1, 2, 9)

Sept 17 - Making Memories: Conceptual Issues and Methodologies, continued (Rudy Ch 1, 2, 9)

Sept 24 – The Neurobiology of Learning and Memory: Systems Analysis (Rudy Ch 15-17)

Oct 1 – Topics and dates will be assigned for presentations (to begin on Oct 29)

The Neurobiology of Learning and Memory: Systems (Rudy Ch 15-17), Cellular and Molecular (Rudy Ch 10, 11)

Oct 8 – The Neurobiology of Learning and Memory: Cellular and Molecular (Rudy Ch 10, 11),

Oct 15 – Memory Modulation Systems (Rudy Ch 13)/Reconsolidation (Rudy Ch 14)

Oct 22 – Midterm on lecture material

Oct 29 – Student presentations

Nov 5 – Student presentations

Nov 12 – Student presentations

Nov 19 – Student presentations

Nov 26 – Student presentations

Labs: N/A

Course Assignments and Tests:

Evaluation: Your grade will be determined from four components:

1. Midterm Exam (20%; Oct 22): Following the series of lectures on the neurobiology of learning and memory, you will write a midterm to assess your understanding of this important material. The exam will consist of 7-10 short-answer questions and will be 2h in duration. **This exam will be in-person. Assuming no significant changes to campus-wide policy, online/remote exam options will NOT be offered.**

2. PowerPoint Presentation (35%; dates and topics to be assigned Oct 2; presentations begin Oct 29): Your evaluation from the presentation will be based on both form and content. It is important that you demonstrate a clear understanding of the material you are presenting and that this material is clear to the audience. Overly flashy presentations will not earn you extra points if the material covered is highly superficial and/or poorly communicated. Each presentation should be 15 min long to allow for 5 min of questions and class discussion.

The presentations will be based on student-chosen scientific research articles related to or expanding upon issues covered in the first half of the course and the list of topics below**. Each student will choose an article and present the background to the study (including any particularly relevant recent findings that lead directly to the target study), as well as the primary methodology, the main results, their implications, and the authors' conclusions.

For full marks, you should endeavor to go beyond a surface level presentation of the assigned material, incorporating additional readings and your own critical thoughts into your preparation and, ideally, clearly describing empirical findings that support the arguments being made.

***You should confirm your chosen article with me no later than 1 week prior to your presentation and send me a pdf so I can post the paper on CourseLink for the class to access.

Although not required, I am happy to meet with you the week before your presentation to discuss any questions you might have. Just email me to set up a time to meet.

The day of your presentation, please be sure to email your slides no later than 8am so I can load them onto my laptop. All presenters will use my computer to mitigate potential technical issues during class time. There will be 7-8 presentations per week.

**List of potential presentation topics (Note: I am open to you choosing a different topic, but please run it by me first):

Episodic memory, procedural learning/habits, emotional memory/fear, forgetting, sleep, reconsolidation, memory updating, false memories, engrams, glial cells, genetics/epigenetics

3. Burning Questions (15%; weekly, starting Oct 29): By the Sunday following each class, all students are required to provide a Reflection Paper (0.5-1 page, double-spaced) on one presentation from the seminar highlighting what new knowledge or insights have been gained and a single “burning question”, i.e., an idea that the presentation or study raised for you upon reflection. These should be delivered to the Dropbox created specifically for each week’s seminar on the CourseLink site. These assignments are meant to reflect your own thoughts and learning, so any use of generative AI is prohibited. You will only receive the 15% for this course component if you submit a reflection based on a presentation from EACH of the FIVE student presentation classes (Oct 29-Nov 26). These classes will be recorded for those who cannot attend in-person.

4. Final research proposal (30%; Electronic copy due in the CourseLink Dropbox for PSYC*4470 by 11:59pm on Monday, Dec 1; no hardcopy required): Throughout the course, we will be discussing topics related to the neural bases of memory. For the final research proposal, you will design an experiment to address a question related to one of these topics (you may also suggest topics not included in the course material if you have a specific interest). The proposal will be double-spaced and written in the format of a scientific article (using *Journal of Neuroscience* style), including title page, abstract, introduction, methods section (including the design of the experiment and how you intend to analyse the results), expected results (with mock graphs), and brief discussion. The introduction should be no longer than five pages and should refer to material from *at least five primary references* based on a literature search. The methods section should describe the proposed methodology in sufficient detail to be replicated and should be written in the future tense. The discussion should be no more than three pages long and should consider your predicted findings in the context of the literature presented in your introduction.

While AI tools, such as ChatGPT, can be excellent resources, along with other tools, for such a paper, DO NOT submit a paper WRITTEN by AI; confirm details gleaned from AI using other sources, and write your paper in your own words. If we determine that your paper, or a significant portion of it, was written by AI, you will receive a grade of 0% on the assignment.

You will be penalized 20% per day for late submissions.

Assignment or Test	Due Date	Contribution to Final Grade (%)	Learning Outcomes Assessed
Midterm exam	Oct 22	20%	3, 4
Oral presentation	To be assigned	35%	1, 3, 4, 5
Burning questions	Weekly, starting Oct 29	15%	1-4
Research proposal	Dec 1, 11:59PM	30%	1, 2, 4

Additional Notes (if required): N/A

Final examination date and time: N/A

Final exam weighting: N/A

Course Resources

Required Texts: N/A

Recommended Texts: Much of my early lectures will incorporate material from Rudy, J.W. (2014). The Neurobiology of Learning and Memory. 2nd Edition. Sinauer Associates, Inc. I will scan the relevant chapters from this book and post pdfs on CourseLink.

Lab Manual: N/A

Other Resources:

Web site: lecture notes will be available online before each class. Just logon to CourseLink using your U of G email username and password.

All **seminar papers** will be made available on CourseLink as pdfs. These should be read prior to the seminar in which they will be presented.

Field Trips: N/A

Additional Costs: N/A

Course Policies

Grading Policies

Students will be penalized 20% per day for late submissions of final papers.

Course Policy on Group Work: N/A

Course Policy regarding use of electronic devices and recording of lectures:

Electronic recording of classes is expressly forbidden without consent of the instructor. When recordings are permitted they are solely for the use of the authorized student and may not be reproduced, or transmitted to others, without the express written consent of the instructor.

University Policies

Academic Consideration

When you find yourself unable to meet an in-course requirement because of illness or compassionate reasons, please advise the course instructor in writing, with your name, id#, and e-mail contact. See the academic calendar for information on regulations and procedures for

Academic Consideration:

[Academic Consideration, Appeals and Petitions](#)

Academic Misconduct

The University of Guelph is committed to upholding the highest standards of academic integrity and it is the responsibility of all members of the University community, faculty, staff, and students to be aware of what constitutes academic misconduct and to do as much as possible to prevent academic offences from occurring.

University of Guelph students have the responsibility of abiding by the University's policy on academic misconduct regardless of their location of study; faculty, staff and students have the responsibility of supporting an environment that discourages misconduct. Students need to remain aware that instructors have access to and the right to use electronic and other means of detection. Please note: Whether or not a student intended to commit academic misconduct is not relevant for a finding of guilt. Hurried or careless submission of assignments does not excuse students from responsibility for verifying the academic integrity of their work before submitting it. Students who are in any doubt as to whether an action on their part could be construed as an academic offence should consult with a faculty member or faculty advisor.

The Academic Misconduct Policy is detailed in the Undergraduate Calendar:

[Academic Misconduct Policy](#)

Accessibility

The University of Guelph is committed to creating a barrier-free environment. Providing services for students is a shared responsibility among students, faculty and administrators. This relationship is based on respect of individual rights, the dignity of the individual and the University community's shared commitment to an open and supportive learning environment. Students requiring service or accommodation, whether due to an identified, ongoing disability or a short-term disability should contact Student Accessibility Services as soon as possible.

For more information, contact SAS at 519-824-4120 ext. 56208 or email accessibility@uoguelph.ca or see the website: [Student Accessibility Services Website](#)

If you are registered with SAS and require accommodations for exams, it is YOUR responsibility to contact them and book times well in advance of the actual date.

Course Evaluation Information

Please refer to the [Course and Instructor Evaluation Website](#) .

Drop date

The last date to drop one-semester courses, without academic penalty, is ***November 28, 2025***.

For regulations and procedures for Dropping Courses, see the Academic Calendar:

[Current Undergraduate Calendar](#)