

University of Waterloo, Department of Psychology
Psychology 461 - Cognitive Neuroscience of Memory
Fall 2017 - Tuesdays 8:30am-11:20am, PAS 2086

Instructor and Teaching Assistant Information

Instructor: Myra Fernandes, PhD

Office: PAS 4054

Office Phone: 519-888-4567 x32142

Office Hours: Tuesday 11:30am - 12:30pm or by appointment

Email: mafernan@uwaterloo.ca

TeachingAssistant none

Course Description

This course considers the cognitive and neural organization of memory. We will examine why some memories are better remembered than others, the nature of true and false memories, the effects of drugs on studying, remembering, and forgetting, and the consequences of brain injury to memory function. The biological basis of human memory has been examined with four methods: analyses of neurological patients, investigations using neuroimaging, experiments with animals, and basic theoretical cognitive research. By reviewing and discussing classic and current research using these methods, and their findings, students will develop an understanding of how cognitive neuroscience informs current theories as well as how our memory works in everyday life. I encourage discussion from students to clarify material. I think the class will be more informative if you participate by asking, and answering, questions! It is also extremely important that you read the assigned material as well as attend lectures!

Course Goals and Learning Outcomes

Upon completion of this course, students should be able to:

- A. Identify and describe the role of key brain regions involved in memory, including:
 - the hippocampus
 - the frontal cortex
 - the effect of drugs on memory
 - networks of brain regions contributing to enhanced and impoverished memory

- B. Describe how developmental, educational, and environmental context shape and constrain memory, specifically:

- be able to identify specify conditions and techniques that lead to benefits in memory
identify real-world scenarios that hurt memory encoding and retrieval
describe current cognitive and neuropsychological-based theories of memory function

Required Text

- *Copies of various pdf files of journal articles, book chapters, and podcasts. Links to files will be posted on the course website via LEARN*

Information Available on LEARN

The course web page can be found on LEARN at <https://learn.uwaterloo.ca/>. Here, you will find links to the syllabus, to my lecture slides, and to important announcements. Supplemental readings may be posted here, as well.

Course Requirements and Assessment

A summary of each evaluation is presented below. Additional information, suggested topics for presentation, tips on how to put together a presentation, suggested sources for presentations will also be posted on LEARN.

Assessment	Date of Evaluation	Weighting
In-Class Test	October 17th	30%
Presentation: linking movies to memory research	October / November	20%
Podcast: Topics in Memory	November	20%
Participation	October / November	10%
Legacy Book: Contributions from neuroscience	due December 11 th	20%
Total		100%

Detailed explanation of Assessments

In-Class Test: This test is worth 30% of your grade, and will consist of multiple choice, several short answer questions, and a few longer essay-style questions (with choice) based on material covered in my Lectures. Allowed 1 hour and 30 minutes.

Presentation: linking movies to memory research: Work will be completed and presented in groups of 2 students. Each group will lead the class, via a 'Power Point-type' presentation, for a total of 45 minutes:

Part 1 (30 minutes): Choose a movie from the list provided. Present a short synopsis. Identify 1 (or 2) correct and 1 (or 2) incorrect depiction of 'how memory works' from the movie, with supporting clips to illustrate. Explain the memory system implicated;

find and present 1 published research article supporting the correct depiction, and 1 article explaining what was portrayed incorrectly. Prepare a 1-page handout for your classmates that summarizes key points from your presentation.

Part 2 (15 minutes): Prepare a summary of how your film could have better and/or more accurately depicted 'how memory works' and share this with your classmates. Explain to the class, using at least 1 supporting research paper, why your 'alternative' depiction of memory is better supported by current theories of memory. Lead a discussion in which your classmates share their views of aspects of memory illustrated in the film. This can be facilitated by preparing 1-2 "Questions" on your topic for your classmates to answer. Your job during the Discussion is to guide students to the answers by referring to published papers you have read on the topic, bringing up relevant experiments, and interpreting your classmates views.

* Grading of Group Presentations: Part of your grade for this assessment will be provided by your classmates. Each of your non-presenting classmates will submit a confidential grade for your entire group. The average grade from your peers will be calculated, and is worth 10% of your final mark; The remaining 10% of your grade will be assigned, separately for each individual, by Dr. Fernandes, for a total of 20%.

Topics in Memory & Podcast: Work in groups of two students.

Part 1. Choose one of the assigned chapters/reading. Each student in the group must prepare a 10-minute 'Power Point-type' presentation in which they review the background and supporting evidence from 1-2 sections from the chapter/reading.

Part 2. As a group, students must select 1 recent study on their topic (published post-2013) and conduct a 5-6 minute 'podcast interview' in which 1 student acts as the interviewer, and the others as the interviewee. Interview questions and answers need to convey the following: What was the study about, How was it conducted, and Why is the study interesting to the general public.

Part 3. Following your podcast, you will then lead an informal Discussion session, for 15 minutes. You should prepare 2 "Questions" on your topic for your classmates to answer. Your job during the Discussion is to guide students, bring up relevant experiments, and jump in with an opinion on the topic. You can bring in extra materials (newspaper clippings) or prepare demos related to your prepared Questions. During this time, your classmates will provide answers to your Questions, and will participate in the Discussion that you will lead. Please email a copy of each student's Power Point presentation to Dr. Fernandes by 4pm the day prior to your presentation. Please print the script of your podcast to hand in on the day of your presentation.

Participation:

For the *Presentations*, as well as *Post-podcast Discussion session* (except your own), you will be able to earn 'participation' marks.

The movies being presented by each group will be listed on LEARN. For *any 2 of these*, you can earn 2% each (4% total) by preparing a 1-page "Thought paper" in which you a) watch the movie and discuss the memory system implicated and b) pinpoint 1 to 2 examples showing either correct or incorrect depictions of memory.

During *Presentations*, as well as *Post-podcast Discussion sessions*, you can also earn up to 1% per presentation (except your own) up to a maximum of 6%, for sharing your ideas and insights in spoken format, and answering questions posed by presenters.

Legacy Assignment - Brain Book: Your Contribution to Understanding Cognitive Neuroscience:

Pick a brain area. Create a 1-page Summary sheet showing a) your drawing of your selected region, b) a list of known connections to/from this region, c) a description of the role of this brain region in cognition and in memory, and d) highlights of behavioural disorders or abnormalities suffered when this region is injured.

In the next 2 pages, (write in 12-point font, double-spaced, 1cm margins all around) describe how recent advances (since 2014) in neuroimaging (fMRI, PET, EEG, ERP, TMS), or the study of patients, have contributed to, or changed, our understanding of the role of this region to memory. Include a 4th page listing your cited references.

Assignments will be part of a Legacy Book for Psych 461, which consists of a compilation of student's work over the years. (If you do not want your assignment included in this Legacy Book please inform Dr. Fernandes; you will also have the option of having your work included anonymously)

About Your Instructor

In my research I aim to understand the processes involved in higher cognitive functions such as memory, attention and language. I use a combination of behavioural tests and neuro-imaging to identify the brain basis of these functions. In addition I study how the normal aging process affects cognition. This work is used to test and refine current models of how memory encoding and retrieval operate.

Course Outline:

Week	Date	Topic	Readings
1	9/12	Introduction to Memory; Methods in Cognitive Neuroscience	Course syllabus
2	9/19	Kinds of Memory	
3	9/26	Learning & Organization ; Amnesia	Castel, A.D., Vendetti, M., and Holyoak, K.J. (2012). Fire drill: Inattention blindness and amnesia for the location of fire extinguishers. <u>Atten Percept Psychophys</u> , 74:1391–1396.
4	10/3	Working Memory; Drugs and Memory	
	10/10	Fall Break	
5	10/12	Emotions & Memory; Aging	Mather, M., Canli, T., English, T., Whitfield, S., Wais, P., et al., (2004). Amygdala responses to emotionally valenced stimuli in older and younger adults. <u>Psychological Science</u> 15, 259-263.
6	10/17	In-Class Test Tips and Q & A about presentations; Meet with Group	
7	10/24	Review of Test Groups 1, 2 Selection of Movies – Set 1	Life of Pi, Fantasia, Pulp Fiction, Jason Bourne, Avatar, Cast Away, Groundhog Day, After Life, Crash, Eternal Sunshine of the Spotless Mind, Cocoon, Finding Nemo, other
8	10/31	Groups 3, 4, 5 Selection of Movies – Set 2	Slumdog Millionaire, The Joy Luck Club, Cinema Paradiso, Titanic, The Kite Runner, Rainman, Face/Off, Born on the Fourth of July, Rachel Getting Married, other

Week	Date	Topic	Readings
9	11/07	<p>Groups 6, 7 Selection of Movies – Set 3</p> <p>Discussion of Careers in Neuroscience</p>	<p>Desperately Seeking Susan, Primal Fear, Momento, On Golden Pond, Away from Her, other</p>
10	11/14	<p><u>Memory Topics & Live Podcasts</u></p> <p>Eliminating unwanted memories?</p> <p>‘Pharmaceuticals and beyond’ Drugs and Memory</p>	<p>(Links to sample radio podcasts and interviews to be posted on Learn)</p> <p>Nader, K. (2003). Memory traces unbound. <u>Trends in Neuroscience</u>, <u>26</u>, 2, 65-72</p> <p>Or</p> <p>Nader, K., and Einarsson, E. (2010). Memory reconsolidation: an update. <u>Ann. New York Acad of Sci.</u>, <u>1191</u>, 27-41.</p>
11	11/21	<p><u>Memory Topics & Live Podcasts</u></p> <p>The injured brain</p> <p>Is the Brain fallible? Distortions of memory</p> <p>How sleep helps you remember</p>	<p>Squire, L.R., & Wixted, J.T. (2011). The cognitive neuroscience of human memory since H.M. <u>Annu. Rev. Neurosci.</u>, <u>34</u>, 259–88.</p> <p>Loftus, E. F. (2005). Planting misinformation in the human mind: A 30-year investigation of the malleability of memory. <u>Learning & Memory</u>, <u>12</u>, 361-366.</p> <p>Lewis, P.A., and Durrant, S.J. (2011). Overlapping memory replay during sleep builds cognitive schemata. <u>Trends in Cognitive Science</u>, <u>11</u>, 343-351.</p>
12	11/28	<p><u>Memory Topics & Live Podcasts</u></p> <p>Does your cat remember?</p> <p>Can you see it? What can we learn from</p>	<p>Clark, R.E. and Squire, L.R. (2013). Similarity in form and function of the hippocampus in rodents, monkeys, and humans. <u>PNAS</u>, <u>110</u>, 10365-10370.</p> <p>or</p> <p>Clayton NS, Bussey TJ, Dickinson A (2003). Can animals recall the past and plan for the future? <u>Nature Reviews Neuroscience</u> <u>4</u>:685-691</p> <p>Wagner, A.D., Schacter, D.L., Rotte,</p>

Week	Date	Topic	Readings
		studies of brain activity?	M. et al. (1998). Building memories: Remembering and forgetting of verbal experiences as predicted by brain activity. <i>Science</i> , 281, 1188-1191
		Course Evaluations	

Electronic Device Policy

Laptops for notetaking are permitted during lectures. Web surfing and emailing during lectures will not be permitted, however. All cellphone ringers must be turned off during lectures and presentations.

Attendance Policy

Attendance is not mandatory, however students who attend class regularly perform better than those who do not. If a class is missed, it is up to the student to get lecture notes from a fellow classmate.

Attendance during presentations is encouraged and required for participation marks. If a student is ill and unable to come to class for any of the Presentation dates, or is unable to complete an assignment, the instructor must be notified PRIOR to the Due Date. Furthermore, the student must provide appropriate documentation of illness from the Office of Health Services. Failure to do so will result in a mark of 0% for the evaluation

Institutional-required statements for undergraduate course outlines

Academic Integrity

Academic Integrity: In order to maintain a culture of academic integrity, members of the University of Waterloo are expected to promote honesty, trust, fairness, respect and responsibility. See the [UWaterloo Academic Integrity webpage](#) and the [Arts Academic Integrity webpage](#) for more information.

Discipline: A student is expected to know what constitutes academic integrity, to avoid committing academic offences, and to take responsibility for his/her actions. A student who is unsure whether an action constitutes an offence, or who needs help in learning how to avoid offences (e.g., plagiarism, cheating) or about “rules” for group work/collaboration should seek guidance from the course professor, academic advisor, or the Undergraduate Associate Dean. When misconduct has been found to have occurred, disciplinary penalties will be imposed under Policy 71 – Student Discipline. For information on categories of offenses and types of penalties, students should refer to [Policy 71 - Student Discipline](#). For typical penalties check [Guidelines for the Assessment of Penalties](#).

Concerns About a Course Policy or Decision

Informal Stage. We in the Psychology Department take great pride in the high quality of our program and our instructors. Though infrequent, we know that students occasionally find themselves in situations of conflict with their instructors over course policies or grade assessments. If such a conflict arises, the Associate Chair for Undergraduate Affairs (Richard Eibach) is available for consultation and to mediate a resolution between the student and instructor: Email: reibach@uwaterloo.ca; Ph 519-888-4567 ext. 38790

A student who believes that a decision affecting some aspect of his/her university life has been unfair or unreasonable may have grounds for initiating a grievance. See [Policy 70](#) and [72](#) below for further details.

Grievance: A student who believes that a decision affecting some aspect of his/her university life has been unfair or unreasonable may have grounds for initiating a grievance. Read [Policy 70 - Student Petitions and Grievances](#), Section 4. When in doubt, please be certain to contact Richard Eibach, the Associate Chair for Undergraduate Affairs who will provide further assistance; reibach@uwaterloo.ca.

Appeals: A decision made or penalty imposed under Policy 70 - Student Petitions and Grievances (other than a petition) or Policy 71 - Student Discipline may be appealed if there is a ground. A student who believes he/she has a ground for an appeal should refer to [Policy 72 - Student Appeals](#)

Accommodation for Students with Disabilities

Note for students with disabilities: The [AccessAbility Services](#) office, located on the first floor of the Needles Hall extension (1401), collaborates with all academic departments to arrange appropriate accommodations for students with disabilities without compromising the academic integrity of the curriculum. If you require academic accommodations to lessen the impact of your disability, please register with the AS office at the beginning of each academic term.

Accommodation for course requirements

- Students requesting accommodation for course requirements (assignments, midterm tests, final exams, etc.) due to illness should do the following:
 - seek medical treatment as soon as possible and obtain a completed uWaterloo [Verification of Illness Form](#)
 - submit that form to the instructor within 48 hours.
 - (if possible) inform the instructor by the due date for the course requirement that you will be unable to meet the deadline and that documentation will be forthcoming.
- In the case of a missed final exam, the instructor and student will negotiate an extension for the final exam, which will typically be written as soon as possible, but no later than the next offering of the course.
- In the case of a missed assignment deadline, midterm test, or quiz, the instructor will either:
 - waive the course component and re-weight remaining term work as he/she deems fit according to circumstances and the goals of the course, or
 - provide an extension.
- In the case of bereavement, the instructor will provide similar accommodations to those for illness. Appropriate documentation to support the request will be required.
- Students who are experiencing extenuating circumstances should also inform their academic advisors regarding their personal difficulties.

Official version of the course outline

If there is a discrepancy between the hard copy outline (i.e., if students were provided with a hard copy at the first class) and the outline posted on LEARN, the outline on LEARN will be deemed the official version. Outlines on LEARN may change as instructors develop a course, but they become final as of the first class meeting for the term.