

NRSC 2205: Cellular Basis of Learning and Memory

Prospectus: *This prospectus is intended to provide a general overview of the format of the class for Fall 2024. There will likely be minor changes to this prospectus.*

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Office hours: TBD

Course Description: This course will introduce students to the molecular, cellular, and systems-level mechanisms that underlie how experiences are acquired, stored and retrieved in the central nervous system. The interdisciplinary nature of this topic reflects the diverse, historical approaches used to understand how organisms, from *aplysia* to humans, learn and remember. To scaffold our discussions, we will explore how key methodological advances in the field of neuroscience produced a paradigm-shift in our understanding of the neurobiology of learning and memory. The course is primarily lecture-based with opportunities for students to engage actively with the course material in smaller group settings.

Course Objectives:

- Students will build on the foundational neuroscience concepts discussed in NRSC 1110 as we explore the neurobiological mechanisms involved in learning and memory.
- Students will expand their understanding of neuroscience techniques used to understand how the nervous system stores information.
- Students will build on their analysis of empirical research, critically reviewing the design and interpretation of empirical papers throughout our course.
- With the goal of improving their scientific communication skills, students will have opportunities to communicate their understanding of topics in learning and memory through written assignments.

Readings: Assigned textbook TBD

Course Requirements and Grading:

Given that the majority of course content can only be garnered from the lectures and class discussions, attendance is mandatory and will factor into your participation grade. Should you need to miss a class due to illness or other circumstances please e-mail me prior to class if possible. **It is expected that all students will come to class having read the assigned reading and be willing to share your thoughts in an interactive way.**

Grading:

Participation and Attendance	15 %
Mini-Assignments (3 mini assignments worth 5 marks each)	15 %
Mid-term Exam	25%
Final Exam	30 %
E-Portfolio	15 %

Participation: (15%)

- Overall participation marks will be dependent on attendance and posts to discussion boards and other in class activities.
- Thought prompts related to readings will be posted on canvas. These exercises are designed to stimulate your thinking and processing of the course material and to help us focus seminar discussions on what resonated most with the class.

Mini-Assignments: (15%)

- These assignments will be take-home and open book and require you to integrate and understand the material and readings discussed during class. There will be 3 mini-assignments worth 5 marks each.

Exams: (25% + 30%)

- Exams will consist of multiple choice, short answers and one longer essay question integrating material learned in class.

E-Portfolio: (15%)

- Details to come.

Date	Topic	Readings 1-2 Chapters per week.
Week 1:	Introduction to Course	
Week 2	Historical Look at Learning and Memory / HM and the Road Forward	<i>Squire, L. R. (2009).</i> The legacy of patient H.M. for neuroscience. <u>Neuron</u> , 61:6-9.
Week 3	Conceptualizing Learning and Memory	

Week 4	Learning and Memory in Simple Organisms: Focus on Aplysia	
Week 5	Molecular Signaling in Neurons and Role in our Memory Processing	
Week 6	Skill and Procedural Learning Cellular and Structural Focus	
Week 7	Non-neuronal Components of Neuroplasticity: Focus on White Matter	
Neural Substrates of Learning and Memory		
Week 9	The Role of the Hippocampus in Learning and Memory	

Week 10	Hippocampus and Spatial Memory: Place Cells	
Week 11	Amygdala and Role in Emotional Memories	
Week 12	Topics in Learning and Memory	
Week 13	Topics in Learning and Memory	
Week 14	Topics in Learning and Memory	
Week 15	Final Exam	Review