

MEDIAL TEMPORAL LOBE

Class Times: W 10:10am-12:30pm in RKC 200 | Office Hours: Tu 2-3pm/Th 3-4pm/by appointment

Instructor

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 (preferred contact)

Course Materials

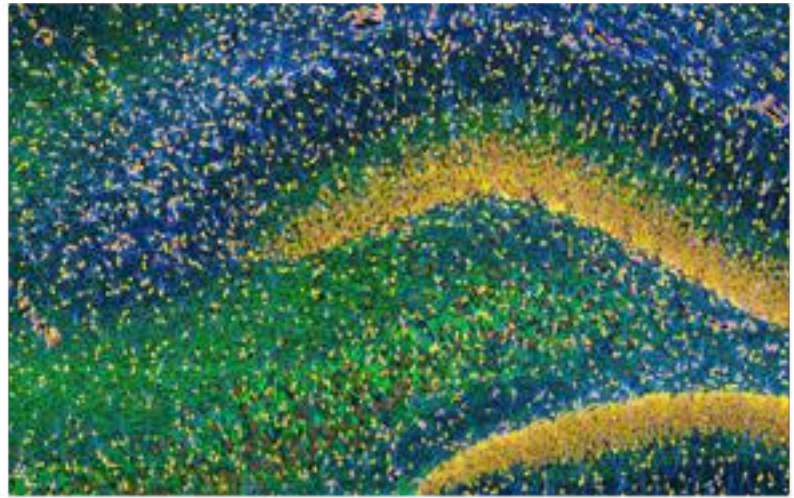
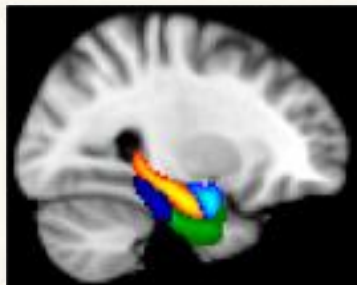
Course materials will be posted on **Moodle2** (see footer for URL & access code).

Prerequisites

This course is open to moderated students in biology or psychology, as well as members of the Upper College pursuing a concentration in MBB.

Assessment

- Research proposal: **350pts**
- Work cited papers: **200pts**
- Class participation: **200pts**
- Article presentation: **150pts**
- Moodle posts: **100pts**



Course Overview

The medial temporal lobe is central to the acquisition, storage, consolidation, and retrieval of memories of events. In this seminar, we will explore the development of this brain region—over the lifespan and evolution—in the context of the theories and tests developed to explain the cognitive processes supported by the hippocampus and surrounding cortex. From mapping space to linking together (or, conversely, separating) different aspects of experience, our discussions will consider data from animal and computer models, case studies in neuropsychology, and cognitive neuroscience experiments.

Joint Responsibilities

Achieving the broad aims of this course requires commitments from instructor and students alike. Below you will find an outline of some of those responsibilities.

- **Your instructor agrees to...**
 - a) Make himself available outside of class during posted office hours (and by appointment, as



Learning Objectives

Coming out of this course, you should have:

- The ability to talk and write competently about the various cognitive processes and neural underpinnings of memory systems in human and non-human animals.
 - Developed an appreciation for the primary research methods and theories used to understand memory and brain specialization, as well as their limitations.
 - Honed your ability to summarize, critique, and discuss empirical articles.
 - The capacity to develop a solid experimental design that enables the examination of an aspect of memory that interests you.
- a) necessary) to answer questions, provide extra help, and discuss matters related to the course of study.
 - b) Respond in a timely fashion (typically by the end of the next school day) to email queries. In the event that more time is required to fully address the student query, the instructor will acknowledge receipt of the email and provide the student with an estimated response time.
 - c) Facilitate a thoughtful, considerate, and engaging learning environment.
 - d) Provide adequate time to complete assignments, minimize changes to the published schedule/ assignments, and immediately notify students about any such changes.
 - e) Provide comprehensive and fair assessments of materials presented or assigned. Assignments, with a level of feedback commensurate with the nature and aims of the task, will be returned to students in a timely fashion.
 - f) Create and welcome opportunities for students to provide feedback on the course/teaching throughout the semester.
- **You are responsible for...**
 - a) Showing up to class regularly, on time, and prepared.
 - b) Keeping up with the assignments and readings.
 - c) Substantively participating in class discussions. It is important that you speak up if there's anything in the readings you don't understand (chances are, others have the same question). Note that a top-notch level of participation *does not necessitate responding to every question* raised in class or online; active or passive efforts to welcome contributions from everyone in the class are also looked upon favorably.
 - d) Keeping distractions to a minimum in class. Phones should be turned off or set on vibrate (and kept out of sight).



Best Practices

To make the most of office hours, it is recommended that you:

- Avoid waiting until the last minute (before an exam or due date) to attend. Seeking extra help or clarification well in advance of deadlines will leave you plenty of time to act on advice discussed.
- Email the instructor in advance or bring with you a concise list of topics/questions you wish to discuss, if possible. Itemizing in this way helps ensure all your questions are addressed and saves you time in the long run. That said, *dropping by for a spontaneous, broader chat is also most welcome*. Tea and/or coffee will be available.

When emailing the instructor, keep in mind that:

- Taking the time to draft a concise message with proper spelling/punctuation is appreciated and will be met with a similarly considered reply.

Writing/other academic help is available through [Bard Learning Commons \(lc@bard.edu\)](http://Bard Learning Commons (lc@bard.edu)).

- e) Submitting assignments on time, digitally via Moodle (unless prior arrangements have been made with the instructor). *A late assignment will immediately be subject to a 10% penalty, with an additional 10% penalty leveled against that assignment's score for every 24 hours it remains late. The only extensions that will be granted involve documented cases of medical or family emergency.* Students requiring alternative testing or course accommodations (e.g., due to disability) should contact the instructor privately as early as possible after the first class meeting.
- f) Upholding academic integrity. Plagiarism (e.g., copying other's words or ideas without proper citation) will not be tolerated. You are expected to work independently on each graded assignment, unless explicitly instructed otherwise. When in doubt as to what constitutes plagiarism within the confines of this course, you are encouraged both to consult the student handbook (<http://www.bard.edu/dosa/handbook/index.php?aid=1201&sid=705>) and to contact the instructor for further guidance. There is absolutely no penalty for asking for clarification; however, failing to abide by Bard's standards for academic integrity can result in failing the course.

Assessment Details

• **Empirical research proposal (350 points)** should pertain to the material covered in the course, and the topic must be approved in advance. The experiment should be fully developed, with an introduction, proposed methods section, predictions, and discussion of issues. The experiment may use any of the methods of cognitive neuroscience, including imaging, animal experimentation, or human behavioral research. The project will be broken down into four parts: (a) an initial "abstract" submission in which you briefly describe your experiment's objective & method--25 points; (b) a presentation in which you explain your experiment idea to the class and receive further feedback--75

points; (c) an "initial submission" of your *full paper*--150 points; and (d) a revision in which you incorporate your "reviewers'" (i.e., that of your peers and instructor) feedback and include a "response to reviewers" cover page, which outlines how you addressed their concerns--100 points. The final paper should be around 10 double-spaced pages (excluding your reference list and title page) and follow APA style (see Moodle formatting guides). Please use a 12-point font with reasonable margins. Below you'll find a suggested outline for your paper.

- **Introduction** (3-4 pages): What is your research question? What does the existing literature have to say on the subject? Summarize your hypotheses.
- **Methods** (3-4 pages): What is the design of your experiment? What materials (e.g., stimuli) would you use? How are you proposing to collect and analyze the data? Be sure to justify why you are proposing these specific methods and include a statement about informed consent (should you plan to use human participants).
- **Predicted results** (1-2 pages): What do you expect to observe, given your hypotheses and your literature search? Include one or more figures depicting your predicted results. Incorporate commentary on potential challenges/limitations that may obscure the predicted results and how they may be overcome in future work.
- **Discussion** (3-4 pages): Summarize your predicted findings with respect to your hypotheses and previous work. How do your predicted results advance the scientific field and/or benefit the wider community? Be sure to end with an overall concluding paragraph.
- **References** (no page limit; 1-2 pages should suffice): Use APA style. Only cite articles you've read in their entirety. Otherwise, use a construction like: "Newton tried comparing apples to oranges (as cited in Hulbert, 2015)."
- **Work cited papers** (4 required for a total of 200 points; a 5th paper may be submitted for up to 50 extra-credit points) are meant to encourage you to explore how current research is built upon past research. Using any four of the assigned empirical readings as starting points, your task is to conduct a literature search to find a more recent article that has cited each. Google Scholar makes it easy (just click the "cited by..." link), though there are other ways to accomplish the same task. Once you've found a citing article that seems relevant (make sure you have access to the full text), you then are required to write a short paper summarizing the citing article and describing how it relates to the original, assigned article. If you find that the citing article misrepresented the assigned article's findings/perspective (as sometimes happens), highlight that in your paper. Regardless, be sure to include the full citation for the citing article. Each of these four required papers should be 1 (minimum) to 2 (maximum) pages long (double-spaced, 12-point font with



reasonable margins), not including the title page and references. Four such papers are required, but you may submit up to one extra for up to 50 extra-credit points. Only one paper may be submitted per class meeting, so plan accordingly. Papers are due via Moodle before the class in which the relevant paper is being discussed and will not be accepted late (according to the Moodle timestamp).

- **Participation & preparation** (*together accounting for 200 points*) are critical for enabling quality class discussions and learning throughout the semester. What's more, your thoughts, questions, and responses may simultaneously benefit your peers' understanding and the instructor's ability to identify topics that require additional attention. These are just some of the reasons why it is so important that you to regularly attend class, eager and ready to participate, having done all of the readings and assignments with due care and consideration. You should aim to contribute at every class meeting. Your contributions to class discussions will be evaluated in terms of both quality and quantity (remember: all students should be given both the opportunity to contribute and respectful consideration of their questions/comments). You should plan to bring either a digital or physical printout (color, if possible) of the required readings to each class, as we will be scrutinizing figures and text. Throughout the semester, the instructor reserves the right to assign in-class exercises and short take-home assignments to facilitate your understanding of course content. Successful completion of these tasks will count towards your participation grade.
- **Presenting an empirical article** (*150 points*) affords you an excellent opportunity to practice effectively summarizing and critiquing published experimental work. To this end, you will first be assigned one of the designated assigned articles (identified below with *asterisks*) and then prepare a ~20-minute PowerPoint/Keynote/Google Slides presentation. This should include a brief overview of the relevant background and aims of the research, a concise description of the methods, the main findings, and the important conclusions. Importantly, you must also provide your own critical evaluation of the research. Note that adequate preparation for your presentation may mean identifying and reading an additional article or two, so as to ensure that you have the relevant conceptual grounding. After your formal presentation, you are expected to take questions from your audience. Audience members could (and should) ask you anything from questions of clarification to deep conceptual ones. To the extent possible, you should first attempt to answer these questions from a position of authority. After that, you are welcome to open up the floor so that we can work through some of the thornier issues together.
 - All non-presenting students are expected to ask each student presenter *at least one* thoughtful question. These questions will count towards your participation grade. Some of your questions will inevitably arise organically during the presentations; however, you are encouraged to generate some questions of interest while you're reading the source article in advance. Doing so invites deeper consideration of the readings and better prepares you for the class discussion/Q&A.

- Weekly Moodle posts** (100 points) Unless you are scheduled to present during a given week's class, everyone is expected to generate and post to Moodle a Twitter-style headline (140 characters max) encapsulating a main point from one of the assigned readings. Under the headline, you are also required to post at least one thought-provoking discussion question/comment about that reading. The headline and question/comment must be posted by 8pm the Tuesday before the reading is to be discussed. These questions are intended to help you think deeply about the articles as well as to help organize the in-class discussion. Submissions will be graded on a scale from $\sqrt{-}$ to $\sqrt{+}$ (the high end of the scale is reserved for truly exceptional submissions). If, however, you fail to submit a post on time (even if it's only a few minutes late according to the timestamp on Moodle), it will receive a 0. No posts are required for our meetings on 10/5 and 11/30.

 - You are encouraged (though not required) to respond to each others' posts on Moodle before and after class. The more you engage with each other and the material, the more you'll get out of the course.



Summary of Selected Important Dates

9/2 (F)	Preferences for empirical article presentation emailed to instructor
9/9 (F)	Summary of one method described in Andersen, Ch 12.3 posted
9/23 (F)	Proposal abstract due
10/5 (W)	In-class (5-10 minute) presentation of your proposal
11/4 (F)	Initial submission of your full experiment proposal
11/30 (W)	In-class peer review (bring two printed copies of your working draft)
12/2 (F)	Your two peer reviews emailed to relevant peers with instructor cc:ed
11/2 (W)	Final paper with cover letter due

Tentative Course Schedule

Date (day)	#	Topics for Class Assignments
8/31 (w)	1	ORIENTATION (IN THE COURSE & BRAIN SPACE) <ul style="list-style-type: none"> ▶ In-class activity: http://www.med.harvard.edu/aanlib/home.html ~ <i>OPTIONAL: Murray & Wise (2004, Neurobiology of Learning and Memory)</i> ▶ Skim future required readings on Moodle and email the instructor a rank-ordered list of the top three *designated* articles you'd like to present (with the first being your top preference); email your requests by Friday (9/2) at 5pm
9/7 (w)	2	SOME BASIC GROUND[BREAKING]WORK <ul style="list-style-type: none"> • Be prepared to discuss: <ul style="list-style-type: none"> - Andersen et al. (2007, The Hippocampus Book), Ch. 2.1-2.3.7 - Andersen et al. (2007, The Hippocampus Book), Ch. 12 - *Scoville & Milner (1957, Journal of Neurology, Neurosurgery & Psychiatry)* ▶ After class, post a Moodle summary (in your own words) of one of the methods for studying human hippocampal functioning discussed in Anderson Ch. 12.3 (due by Friday, 9/9, at 5pm)
9/14 (w)	3	MTL SEE, MTL DO? <ul style="list-style-type: none"> • Be prepared to discuss: <ul style="list-style-type: none"> - *Warrington & Weiskrantz (1970, Nature)* - *Mishkin (1978, Nature)* - Corkin (1984, Seminars in Neurology)
9/21 (w)	4	EARLY THEORIES OF DISTINCTION <ul style="list-style-type: none"> • Be prepared to discuss: <ul style="list-style-type: none"> - *Cohen & Squire (1980, Science)* - *Graf, Squire & Mandler (1984, JEP:LMC)* - *Gabrieli, Cohen & Corkin (1988, Brain & Cognition)* ~ <i>OPTIONAL: Andersen et al. (2007, The Hippocampus Book), Ch. 13</i> ▶ A brief "abstract" of your experiment proposal, outlining your objective & method, is due this Friday (9/23) by 5pm via Moodle
9/28 (w)	5	WAIT, WTF? <ul style="list-style-type: none"> • Be prepared to discuss: <ul style="list-style-type: none"> - *Vargha-Khadem et al. (1997, Science)* - *Sharon, Moscovitch, & Gilboa (2011, PNAS)* - Annese et al. (2014, Nature Communications) ~ <i>OPTIONAL: Dittrich (2016, The New York Times Magazine)</i> ~ <i>OPTIONAL: Presentation tips</i>

Date (day)	#	Topics for Class Assignments
10/5 (w)	6	BRAINS ON DISPLAY - YOUR EXPERIMENT PROPOSAL PRESENTATIONS <ul style="list-style-type: none"> • Please have read: <ul style="list-style-type: none"> - Gopen & Swan (1990, American Scientist) -- <i>No Moodle post required this week</i> ▶ Come prepared to present your experiment proposal using PowerPoint/Keynote/Google Slides (5-10 minutes max, plus approx. 5 minutes for discussion) ▶ After class: Course feedback survey (online, anonymous)
10/12 (w)	7	OH, THE PLACE CELLS YOU'LL FORM! <ul style="list-style-type: none"> • Be prepared to discuss: <ul style="list-style-type: none"> - *O'Keefe & Dostrovsky (1971, Brain Research)* - *Morris et al. (1982, Nature)* - *Ekstrom et al. (2003, Nature)* ~ <i>OPTIONAL: Hafting et al. (2005, Nature)</i>
10/19 (w)	8	IN ORDER TO CONFIGURE IT OUT, READ THESE: <ul style="list-style-type: none"> • Be prepared to discuss: <ul style="list-style-type: none"> - Rudy & Sutherland (1995, Hippocampus) - *Fortin, Agster, & Eichenbaum (2002, Nature Neuroscience)* - *Schapiro et al. (2014, Journal of Cognitive Neuroscience)*
10/26 (w)	9	DO YOU REMEMBER KNOWING IT? <ul style="list-style-type: none"> • Be prepared to discuss: <ul style="list-style-type: none"> - *Eldridge et al. (2005, Journal of Neuroscience)* - *Ranganath et al. (2003, Neuropsychologia)* - *Hannula et al. (2013, Neuropsychologia)* ~ <i>OPTIONAL: Slotnick (2000, Controversies in Cognitive Neuroscience), Ch. 4</i>
11/2 (w)	10	CUT TO: ANTERIOR HIPPOCAMPUS <ul style="list-style-type: none"> • Be prepared to discuss: <ul style="list-style-type: none"> - *Maguire, Woollett, & Spiers (2006, Hippocampus)* - *Poppenk & Moscovitch (2011, Neuron)* - *Satpute et al. (2012, Emotion)* ▶ Initial submission of experiment proposal due this Friday (11/4) by 5pm via Moodle ~ <i>OPTIONAL: Wang et al. (2014, Science)</i>
11/9 (w)	11	YOU DON'T HAVE TO DECIDE NOW <ul style="list-style-type: none"> • Be prepared to discuss: <ul style="list-style-type: none"> - *Addis, Wong, & Schacter (2007, Neuropsychologia)* - *Guitart-Masip et al. (2013, Journal of Neuroscience)* - *Pravosudov & Clayton (2002, Behavioral Neuroscience)* ~ <i>OPTIONAL: Clayton & Dickinson (1998, Nature)</i> ~ <i>OPTIONAL: Raby et al. (2007, Nature)</i>

Date (day)	#	Topics for Class Assignments
11/16 (w)	12	CONSOLIDATION, REDUX (WITH A VENGEANCE) <ul style="list-style-type: none"> • Be prepared to discuss: <ul style="list-style-type: none"> - *Zola-Morgan & Squire (1990, Science)* - *Ryan et al. (2001, Hippocampus)* - *Przybylski, Roulet & Sara (1999, Journal of Neuroscience)* ~ <i>OPTIONAL: McGaugh (2000, Science)</i>
11/23 (w)	13	ODDS 'N' ENDS <ul style="list-style-type: none"> • Be prepared to discuss: <ul style="list-style-type: none"> - O'Reilly & Norman (2002, TiCS) - <i>computational models of memory</i> - *Kensinger & Corkin (2004, PNAS) - <i>emotional memories & the amygdala*</i> - Josselyn & Frankland (2012, Learning & Memory) - <i>hippocampal development</i> ▶ Have a happy Thanksgiving!
11/30 (w)	14	IN-CLASS PEER REVIEW <ul style="list-style-type: none"> ▶ You are required to read and provide written feedback on at least two other students' papers. Please bring two printed copies (plus a digital copy, if possible) of your working draft to class. Your peer reviews should be sent (scanned, if necessary) to the original author with the instructor carbon copied by Friday (12/2) at 5pm.
12/7 (w)	--	NO CLASS - ADVISING DAY
12/14 (w)	--	NO CLASS - COMPLETION DAY <ul style="list-style-type: none"> ▶ Revised paper with cover letter summarizing your revisions in response to peer/ instructor reviews due today (by 11:59pm via Moodle)

Schedule is subject to change to improve pacing and/or accommodate unforeseen events (e.g., severe weather). However, for planning purposes, every effort will be made to maintain scheduled due dates.