

Cognitive Neuroscience

UN2430 / Course Syllabus / Spring 2021

When / Where

Mondays & Wednesdays, 2:40-3:55pm

Lectures:

Lectures will be pre-recorded and shared on Mondays and Wednesdays, according to the lecture schedule below

Supplementary Class Discussions:

Monday class times (and one Wednesday) will be used for (live, on Zoom) supplementary class discussions, starting on Monday January 11; see schedule below. Zoom links are on Courseworks (under "Zoom Class Sessions")

These sessions are optional but attendance is highly encouraged. The first session (Monday January 11) will go over logistics and tips for the class. There are no live class sessions on Wednesdays, with the exception of one class (see schedule below)

Instructor

Dr. Mariam Aly <ma3631@columbia.edu>

Office hours:

Students are encouraged to attend the supplementary class discussions (see schedule below); these are mostly on Mondays, 2:40-3:55pm

Students can also chat with Dr. Aly after the Monday class discussions end (using the same Zoom link)

One-on-one meetings are available by appointment

TAs

Natalie Biderman <natalie.biderman@columbia.edu>

Office hours: TBA

Jiawen Huang <jh4290@columbia.edu>

Office hours: TBA

Prerequisites

PSYC UN1001 The Science of Psychology, or an equivalent introductory course in psychology.

Registration Restrictions

This course replaces PSYC UN1010 Mind, Brain & Behavior. As such, students who have already taken PSYC UN1010 Mind, Brain & Behavior should not register for this course. Students will not

receive credit towards the Psychology or Neuroscience & Behavior majors for both PSYC UN1010 Mind, Brain, & Behavior and PSYC UN2430 Cognitive Neuroscience; only one of these courses can be used.

Bulletin description

This course provides an in-depth survey of the extant data and models of a wide variety of human cognitive functions. Drawing on behavioral, neuropsychological, and neuroimaging research, the course will explore the neural mechanisms underlying complex cognitive processes, such as perception, memory, and decision-making. Importantly, the course will examine the logic and assumptions permitting the interpretation of brain activity in psychological terms.

Course description

This course aims to provide students with a strong foundation in the field of Cognitive Neuroscience, a field that studies the intricate links between the mind, the brain, and behavior. You will first learn basics about brain anatomy and function, and about the methods used to study how the brain supports cognition and behavior. Then, we will explore the various functions of the brain by taking a journey from lower- to higher-level cognitive processes: we will study how we can sense and perceive the world, act in it, learn and think about it, and remember it.

Role of PSYC UN2430 in the curriculum

PSYC UN2430 Cognitive Neuroscience is an intermediate-level lecture course, open to undergraduates and students in the Post-baccalaureate Psychology program. It fulfills the following degree requirements:

- For the Neuroscience & Behavior major, UN2430 Cognitive Neuroscience can be used to fulfill the P.2. Course in Neuroscience requirement or the P.4. Additional 2000-level Psychology Lecture course requirement but not both (i.e., students wishing to use UN2430 Cognitive Neuroscience to fulfill the P.4. requirement must then take UN2450 Behavioral Neuroscience to fulfill the P.2. requirement). Please note that because of the significant overlap between this course and the previously offered PSYC UN1010 Mind, Brain & Behavior, students are not permitted to count both courses towards the major. Students who have already taken PSYC UN1010 to fulfill their P.2. requirement should register for a different 2000-level course from the approved list.
- For the Psychology major and concentration and for the post-baccalaureate certificate program, PSYC UN2430 Cognitive Neuroscience will meet the Group II (Psychobiology and Neuroscience) distribution requirement.

Course website

The course website (on Courseworks) contains the most up to date information. This syllabus is subject to change, so make sure to check the course website for the most current version, as well as announcements for changes in the schedule.

Readings

Recommended (Optional) Textbook: Brain and Behavior: A cognitive neuroscience perspective, by David Eagleman & Jonathan Downar. Oxford University Press, 1st Edition, 2015

The textbook is available at Book Culture. **Due to health and safety concerns, Book Culture is encouraging students to order books online in advance.** Books can be shipped nationwide or arranged for in-person pick-up at any of Book Culture's stores. It is also available at Book Culture's location on 112th St (536 West 112th Street) but online pre-ordering is still encouraged because of limited store occupancy. You can purchase the book here: <https://www.bookculture.com/book/9780195377682>

Copies of this book are on reserve at the Science & Engineering Library in the Northwest Corner building. Call number: QP360.5 .E24 2016

Slides: My lecture slides and pre-recorded video lectures will be made available on Courseworks, according to the lecture schedule posted above.

Lecture Schedule*

Lectures will be pre-recorded and shared on the designated dates below

Date(s)	Topic	Optional Readings
Jan 11	Why and how do we study the brain?	Chapter 1
Jan 13 & 20	How is the human nervous system organized and how does it work?	Chapters 2-3 (Chapter 4 is optional)
Jan 25 & 27	How do we see?	Chapter 5
Feb 1	How do we hear, feel, taste, and smell?	Chapter 6
Feb 3	No lecture; Live review session on Zoom	
Assigned: Feb 8 Due: Feb 15	Midterm Exam # 1 No lecture on February 8	Exam #1 will cover lectures from Jan 11 to Feb 3 (Chapters 1-3, 5-6)
Feb 10	How do we plan and control movement?	Chapter 7
Feb 15 & 17	How do we pay attention?	Chapter 8
Feb 22 & 24	What are the different kinds of memories?	Chapter 9
March 8	What happens during sleep?	Chapter 10
March 10	How do we produce and understand language?	Chapter 11
March 15	No lecture; Live review session on Zoom	
Assigned: March 17 Due: March 24	Midterm Exam # 2 No lecture on March 17	Exam #2 will cover lectures from Feb 10 to March 15 (Chapters 7-11)
March 22 & 24	How does the brain create emotions?	Chapter 13
March 29 & 31	Why are some things rewarding?	Chapter 14
April 5 & 7	How do we understand other people? ** Final paper due April 5 **	Chapter 15
April 12 & 14	What happens when brain function is abnormal?	Chapter 16

Assigned: April 16 Due: April 23	Final Exam	Everything
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** This is only a rough guide; we may go faster or slower. Any changes to this schedule will be announced in lecture and posted as an announcement on the course website.*

Supplementary Class Discussions Schedule

These discussions will occur Mondays (and one Wednesday) during class time (2:40-3:55pm). They are optional but attendance is highly encouraged. These sessions are meant to broaden your appreciation of cognitive neuroscience and teach you about life as an academic scientist.

These class discussions will take place live on Zoom. The Zoom links can be found on Courseworks, under "Zoom Class Sessions". Material presented in the supplementary sessions is **not** going to be on the tests. Each class discussion will have an overview of the topic by Dr. Aly, with Q&A throughout and at the end.

The full class discussion schedule, and additional resources, can be found [here](#).

Submit questions to Dr. Aly [using this google form](#).

Date	Topic
Mon Jan 11	Introduction of the professor and TAs, overview of the syllabus, discussion of course format and requirements, open questions
Mon Jan 25	Graduate school, doing research in psychology
Mon Feb 1	How the brain's "memory systems" contribute to perception
Wed Feb 3	Ask me to review any material for Midterm Exam #1
Mon Feb 15	Open session for any questions
Mon Feb 22	Links between attention and hippocampal memory (Overview of Dr. Aly's research)
Mon March 8	Overview of classic and contemporary questions in memory research
Mon March 15	Requirements for final paper; ask me to review material for Midterm Exam #2
Mon March 22	Open session for any questions
Mon March 29	What are professor jobs actually like? (Or: A day in the life of Dr. Aly)
Mon April 5	Research with brain-lesioned populations
Mon April 12	Ask me to review any material for the final exam

Grading

Assignment	Assigned Date (Eastern Time)	Due Date (Eastern Time)	% of final grade
Midterm Exam #1	February 8, 2:40pm	February 15, 11:59pm	lower grade: 15% higher grade: 25%
Midterm Exam #2	March 17, 2:40pm	March 24, 11:59pm	
Final Paper	Rubric available now	April 5, 11:59pm	20%
Final Exam	April 16, 9:00am	April 23, 9:00am	40%
Extra Credit	All semester	April 15, 11:59pm	up to 5% added

Exams: 80% of your grade; short answer questions (2 Midterm Exams;1 Final Exam)

For Midterm Exams 1 & 2: the lower grade will be worth 15%, and the higher grade will be worth 25%, of your final grade.

Final Exam: 40% of your grade; cumulative but the last 1/3 of the class (Chapters 13-16) is emphasized

All tests (Midterm Exams #1 and #2, and the Final Exam) will be open-book take-home assignments that can be done over multiple days (see schedule above). Although these tests are open-book and can be done on your own time, you must work alone — you cannot work in groups. The tests will focus on material covered in the lectures (which follow the textbook fairly closely). Material that is only in the textbook and not covered at all in lecture will not be tested. All questions are short answer.

Flexibility in due dates will be granted. Please e-mail Dr. Aly with your request and the reason for it.

My tests emphasize *understanding* and *critical thinking*. You should make sure to know key concepts and definitions, of course, but use those to scaffold a more comprehensive understanding of the material. For example, when you read about a study, make sure you understand *why* and *how* something happens, not just *what* happens. Test questions will primarily focus on your understanding of concepts and ability to apply them in new situations. Again, all of the tests will be open-book. View my Study Tips for guidance on how to prepare, and do the practice test I posted on Courseworks. Note that these study tips and sample exam were from the before-COVID times, when an in-person exam was assigned. But they nevertheless might be useful for your preparation. For the sample exam, focus on the short answer questions (because your exams will all be short answer questions), but the multiple choice and fill-in-the-blank questions will also help you assess your knowledge.

Final Paper: 20% of your grade; must be submitted to Courseworks by **Monday April 5 at 11:59pm**. A detailed rubric is posted on Courseworks.

Write a 3-page, single-space paper on a topic of one of the lectures. Describe what you learned (25% of the grade), what it means and why it is important (25% of the grade), and

implications of what you learned to real-world behavior (25% of the grade). The remaining 25% of your grade is for clarity and organization in your writing. See Courseworks for a detailed rubric (paper is graded out of 100 points).

This paper must be on a topic that we discussed in the lectures. Papers written on topics that we did not discuss in class, even if they are related to psychology or neuroscience, will not be accepted and will result in an F for the paper. If you have any concern that your topic may not be relevant, ask Dr. Aly.

Additional research (beyond the content covered in class and/or the textbook) is optional. If you have references to cite, they should be on a different page (they do not count toward the 3 pages for the paper).

Finally, this should go without saying, but your paper must be in your own words. You cannot copy and paste text from articles, book chapters, or lecture slides into your assignment. Everything you write must be in your own words.

Extra credit: Asking or answering questions on Courseworks discussion boards will result in up to 5% added to your grade. For example, if you had 85% based on the tests and you did all of the extra credit (5% worth), your final grade will be 90%.

The Courseworks discussion is set up with one discussion board for each topic that we cover. For example, one discussion board is: How is the nervous system organized? Another is: How do we see? You will receive a bonus 0.5% for every discussion board that you post in, up to a maximum of 5%. You will only get credit for asking and answering questions on the pinned discussion boards for each class topic.

What matters is how many discussion boards you post in, *not* how many posts per discussion board. In other words, posting 10 questions under "How is the nervous system organized" only gets you 0.5% bonus (because that is *one* discussion topic). Posting 1 question in each of 10 discussion boards will get you 5% (0.5% multiplied by 10).

In order to get credit, your questions on the discussion board must be specific questions that are directly related to the content of the class. Likewise, your answers must incorporate material we learned about in this class.

General examples:

Not an acceptable question: What do we have to know on slide 10 of the Memory lecture?

Acceptable question: Perceptual priming seems to be related to familiarity. Can someone explain why priming is implicit memory but familiarity is explicit memory?

Not an acceptable answer: I'm not sure, but maybe you can ask the TA.

Acceptable answer: I think perceptual priming is implicit because it can occur without awareness, but with familiarity, a person is aware that they have had an experience before.

Additional course notes

Academic integrity

As a member of the academic community, one of your responsibilities is to uphold principles of honesty and integrity. This means that you can only present your own work on assignments and exams — plagiarism is strictly prohibited. You cannot present work as your own when it was done by someone else (e.g., a classmate or a friend, or taken from the internet). Doing so compromises your academic integrity and potentially your academic standing. You are **never** permitted to copy and paste answers that you find on the internet or take from someone else, and minor paraphrasing (e.g., taking someone else's ideas with only a relatively minor change in words) is also not permitted. Always put things in your own words and cite your source(s). If you would like to share a quote from a source (e.g., an article), you may put it in quotations and cite it. But quotations should be used sparingly (one or two sentences at most), and quotations cannot be used instead of answering questions in your own words. If you feel like you are falling behind, don't understand the material, or are not confident about your ability to take tests or do assignments, talk to me as soon as possible instead of taking measures that go against principles of academic integrity. You can read more about this in Columbia's Guide to Academic Integrity (<http://www.college.columbia.edu/academics/academicintegrity>).

Students with disabilities

If you are a student with special needs and require any type of accommodation, make an appointment with me before the first class to discuss your needs. You should also contact the office of Disability Services (<https://health.columbia.edu/disability-services>) before the first class to register for specific accommodations. If you have problems reading specific kinds of text (e.g., based on font or text size), please see me so I can make you exams (and a syllabus, and anything else you need) that you can more easily read.

COVID-19 policies

In order to do well, you are highly encouraged to listen to all of the pre-recorded lectures soon after they are posted, take good notes, and review the notes and lectures prior to the exams. Open-book exams will still be challenging if you are not comfortable with the material, so preparation is still important.

That said, I recognize that these are not normal times, and all of us are facing challenges that have not been a part of our lives before. For this reason, I will aim to be as helpful and accommodating as possible to your unique situations. If you need an extension, please e-mail me as soon as you know you need an extension and explain to me what your needs are so that you can do well.

Letter Grade Assignment (in between whole numbers? 0.5+ will be rounded up)

97-100: A+

87-89: B+

77-79: C+

<69: D

94-96: A
90-93: A-

84-86: B
80-83: B-

74-76: C
70-73: C-

<60: F