

Cognitive Neuroscience

UN2430 / Course Syllabus / Spring 2023

When / Where

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

Instructor

Dr. Mariam Aly <ma3631@columbia.edu>

Office hours: Mondays, 4-5pm or by appointment

Location: Schermerhorn Hall 355D

no office hours on academic or university holidays

TAs

Natalie Biderman <nb2869@columbia.edu>

Office hours: TBA

Location: TBA

Iddo Gefen <ig2467@columbia.edu>

Office hours: TBA

Location: 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 announcements and changes in the schedule.

Course Schedule*

Date(s)	Topic	Optional Readings**
Jan 18	Why and how do we study the brain?	Chapter 1
Jan 23 & 25	How is the human nervous system organized, and how does it work?	Chapters 2-3 (Chapter 4 is optional)
Jan 30 & Feb 1	How do we see?	Chapter 5
Feb 6	How do we hear, feel, taste, and smell?	Chapter 6
Feb 8	Review or catching up	
Feb 13	Midterm Exam # 1	Exam #1 will cover lectures from Jan 18 to Feb 8 (Chapters 1-3, 5-6)
Feb 15	How do we plan and control movement?	Chapter 7
Feb 20 & 22	How do we pay attention?	Chapter 8
Feb 27 & Mar 1	What are the different kinds of memories?	Chapter 9
March 6	What happens during sleep?	Chapter 10
March 8	How do we produce and understand language?	Chapter 11
March 20	Review or catching up	
March 22	Midterm Exam # 2	Exam #2 will cover lectures from Feb 15 to March 20 (Chapters 7-11)
Mar 27 & 29	How do we make decisions?	Chapter 12
April 3 & 5	How does the brain create emotions?	Chapter 13
April 10 & 12	Why are some things rewarding?	Chapter 14
April 17 & 19	How do we understand other people? **Final Paper due April 19**	Chapter 15
Apr 24 & 26	What happens when brain function is abnormal?	Chapter 16
May 1	Review or catching up	
May 10 (tentative)	Final Exam	Everything

* This is only a rough guide, and we may go faster or slower depending on questions asked in class and the difficulty the material poses on any given lecture. Any changes to this schedule will be announced in lecture and posted as an announcement on the course website.

** *Optional readings from Eagleman & Downar (see Readings)*

Readings

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

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

Supplementary (Optional) Textbook: Principles of Behavioral Neuroscience, by Jon C. Horvitz and Barry L. Jacobs. Cambridge University Press.

Copies of this book are on reserve at the Science & Engineering Library in the Northwest Corner building. Call number: QP360 .H674 2023

Any textbook edition (e.g., 1st vs. 2nd edition of a given textbook) should be fine. The content is highly similar across different editions of the same textbook, but more recent editions are more expensive. Only material covered in the lectures will be tested, so textbook edition can be up to your personal preference,

Slides: My lecture slides for each class will be made available on the course website prior to that lecture.

Tests will only cover material discussed in the lectures (which follow the recommended textbook fairly closely). I will post my slides on the course website so that they are available as a study aid, but they will not be a good resource on their own unless you come to class and take notes. **Material that is only in the textbook and not covered at all in lecture will not be tested.**

Grading

Assignment	Date	% of final grade
Midterm Exam #1	February 13	lower grade: 15%
Midterm Exam #2	March 22	higher grade: 25%
Final Paper	April 19 at 11:59pm ET	20%
Final Exam	May 10, 1:10-4pm (tentative)	40%
Extra Credit	by exam date	up to 5% added

Exams: 80% of your grade; multiple choice, fill-in, and short answer (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 12-16) is emphasized

Make-up exams will be allowed only with written justification (e.g., a note by your doctor or advising dean) documenting a physical or mental health issue or a family emergency. Make-up exams must be taken within one week after the exam and cannot be taken before the actual exam.

My tests emphasize *understanding* and *critical thinking*. You should make sure to memorize 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 include more basic definitional / conceptual knowledge as well as application of that knowledge to new scenarios. View my Study Tips for guidance on how to prepare for tests and do the practice test I posted on Courseworks.

Final Paper: 20% of your grade; must be submitted to Courseworks by **Wednesday April 19, 11:59pm**. A detailed rubric is posted on Courseworks.

Write a 3-page single-spaced paper on a topic that we discussed in class. Font size must be 11 or 12. Larger or smaller font sizes may lead to point deductions. Pages must be 8.5" by 11" (standard page size) with 1" margins. Smaller or larger page sizes, or smaller or larger margins, may lead to point deductions.

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. References should be on a different page (they do not count toward the 3 pages for the paper). You can use whichever reference format that you prefer. Your references should be limited to lecture, the textbook, and peer-reviewed journal articles (if applicable; extra research is optional). Websites and popular press articles should not be used as sources of information for your paper, unless you want to make a point about how the media reports science. To find peer-reviewed articles, use [PubMed](#), [Web of Science](#), or [Google Scholar](#). Regular Google searches will turn up a variety of articles, including those that are not peer-reviewed. Because of this, it is recommended that you use [PubMed](#), [Web of Science](#), or [Google Scholar](#) searches instead. If you have doubts about whether your sources are peer-reviewed, ask the TAs or Dr. Aly.

You may incorporate figures and images if you would like, but figures **do not** count toward the 3 pages for the paper. If you hand in 3 pages and a good chunk of that is a figure or image, we may deduct points. If you did not make the figure yourself, you must cite your source.

Going slightly over or under 3 pages (by a few lines) is fine; but we may deduct points if your paper is 1/4 page or more over or under 3 pages, single-spaced.

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.

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

To receive disability-related academic accommodations for this course, students must first be registered with their school Disability Services (DS) office. Detailed information is available online for both the Columbia and Barnard registration processes. Refer to the appropriate website for information regarding deadlines, disability documentation requirements, and drop-in hours (Columbia)/intake session (Barnard). Students registered with the Columbia DS office can refer to the Master TARF section of the DS Testing Accommodations page for more information regarding disability-related academic accommodations for this course.

Attendance and etiquette

It should go without saying that regular attendance is essential (except if you are sick! see COVID policies below), and that you will need to come to class and take notes to do well on the exams. The slides are not a good enough resource on their own, and class is your main opportunity to get clarity on difficult concepts in the textbook. If you must miss a class, borrow notes from a classmate, read the chapter carefully, and come to me or the TAs with any questions.

Coming to class is meaningless if class time is spent inappropriately. Chatting with friends, watching videos online, and browsing social media are not appropriate activities for the classroom. Also, remember to silence your cell phone before class. Generally, eliminate distractions as much as possible to respect your classmates, as well as increase your chance of staying focused and learning the material during class.

COVID-19 policies

It is important that you attend lectures so that you can do well in this class. 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 require accommodations because of COVID-19-related challenges, please e-mail me as soon as you know you need accommodations and explain to me what your needs are so that you can do well.

If you believe you may have COVID or have been in contact with someone who has tested positive, you should stay home! Get notes from a classmate (ask students for notes via the discussion board on Courseworks if you don't know people in class) and talk to me if you need additional help catching up.

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	84-86: B	74-76: C	<60: F
90-93: A-	80-83: B-	70-73: C-	