

# Cognitive Neuroscience

UN2430 / Course Syllabus / Spring 2019

## When / Where

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

## Instructor

Dr. Mariam Aly <[ma3631@columbia.edu](mailto:ma3631@columbia.edu)>

Office hours: Mondays, 4-5pm, Schermerhorn Hall 355D

## TAs

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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 the most current version, as well as announcements for changes in the schedule.

### Course Schedule\*

Date(s)	Topic	Readings
Jan 23	Why and how do we study the brain?	Chapter 1
Jan 28 & 30	How is the human nervous system organized, and how does it work?	Chapters 2-3 (Chapter 4 is optional)
Feb 4 & 6	How do we see?	Chapter 5
Feb 11	How do we hear, feel, touch, and smell?	Chapter 6
Feb 13	Review or catching up	
<b>Feb 18</b>	<b>Midterm Exam # 1</b>	<b>Chapters 1 – 3, 5 – 6</b>
Feb 20	How do we plan and control movement?	Chapter 7
Feb 25 & 27	How do we pay attention?	Chapter 8
March 4 & 6	What are the different kinds of memories?	Chapter 9
March 11	What happens during sleep?	Chapter 10
March 13	How do we produce and understand language?	Chapter 11
March 25	Review or catching up	
<b>March 27</b>	<b>Midterm Exam # 2</b>	<b>Chapters 7 – 11</b>
April 1 & 3	How do we make decisions?	Chapter 12
April 8 & 10	How does the brain create emotions?	Chapter 13
April 15 & 17	Why are some things rewarding?	Chapter 14
April 22 & 24	How do we understand other people?	Chapter 15
Apr 29 & May 1	What happens when brain function is abnormal?	Chapter 16
May 6	Review or catching up	
May 15, 1-4pm (tentative date)	<b>Final Exam</b>	<b>Everything</b>

*\* 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.*

### Readings

**Textbook:** Brain and Behavior: A cognitive neuroscience perspective, by David Eagleman & Jonathan Downar. Oxford University Press, 1<sup>st</sup> Edition, 2015

*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 for each class will be made available on the course website prior to that lecture.

The majority of each test will focus on material covered in the lectures, and the corresponding sections in the textbook. 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. Sometimes I may have to skip slides in the posted lectures if we run out of time in class. If that happens, you should still read the relevant sections in the textbook, as the textbook material may be included in exams.

### Grading

Assignment	Date	% of final grade
Midterm Exam #1	February 18	lower grade: 15%
Midterm Exam #2	March 27	higher grade: 25%
Final Exam	TBA	40%
Final Paper	April 22	20%
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., by your doctor or advising dean). 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 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 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, and do the practice test I posted on Courseworks.

**Final Paper:** 20% of your grade; must be submitted to Courseworks by **Monday, April 22, 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 (20% of the grade), what it means (20% of the grade), why it's important (20% of the grade), and

implications of what you learned to real-world behavior (20% of the grade). The remaining 20% 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).

**Extra credit:** Asking or answering questions on the Courseworks discussion board will result in up to 5% added to your grade.

The discussion board is set up with one discussion section for each topic that we cover. For example, one discussion section is: How is the nervous system organized? Another is: How do we see? You will receive a bonus 0.5% for every discussion topic that you post under, up to a maximum of 5%.

In order to get credit, your questions on the discussion board must be a specific question that is 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, as is presenting work as your own when it was done by someone else (e.g., a classmate or a friend). Doing so compromises your academic integrity and potentially your academic standing. If you feel like you are falling behind, don't understand the material, or are not confident about your ability to take tests, 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.

### ***Attendance and etiquette***

It should go without saying that regular attendance is essential, 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.

### ***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-	