**Cognitive Neuroscience**

UN2430 / Course Syllabus / Spring 2025

Tuesdays and Thursdays, 1:10 – 2:25 pm

**Instructor**

**Dr. Lila Davachi** (ld24@columbia.edu)

Lab Website: <https://davachilab.psychology.columbia.edu/>

Office hours: Wednesdays 11 – 12 pm

Location: 401A Schermerhorn

One-on-one meetings are also available by appointment

**TAs**

**Anna Vannucci** (anna.vannucci@gmail.com)

Office hours: Tuesdays 12–1 pm and Thursdays 2:30–3:30 pm

Location: 409A Schermerhorn

**Claire De La Roche** (cbd2136@columbia.edu)

Office hours: Fridays 12-2pm

Location: 200C Schermerhorn

**Connie Huang** (ch3718@columbia.edu)

Office hours: Mondays 12-2pm

Location: 200C Schermerhorn

**Buyong Kim** (bk2813@columbia.edu)

Office hours: Wednesdays 1-3pm

Location: 354 Schermerhorn Extension

**Prerequisites**

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

**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**

How do we understand the mind? How does the brain support our thinking? This course is focused on the study of the mind and brain, otherwise known as “cognitive neuroscience”. Cognitive neuroscience is an inter-disciplinary area that represents an attempt by cognitive psychologists and neuroscientists to discover mental processes and understand more about them by revealing their neurobiological underpinnings. The approach focuses on human cognitive and emotional processes and relies heavily on the methods and findings of neuroscience. This kind of research has been receiving intense coverage in the media for over a decade and this course should provide you with a deeper understanding of what you might read and hear outside of the classroom.

The topics covered are the major ones in higher-level cognition, and include: object recognition, long-term memory, working memory, attention and cognitive control, emotion, learning, and decision making. To understand the cognitive-neuroscience approach to these topics, students will be introduced to some elementary neuroanatomy, to the logic of studies with neurological and particularly psychiatric patients, and to functional neuroimaging techniques, particularly Magnetic Resonance Imaging (fMRI). The goal is to use these techniques, along with behavioral measures, to understand the topics of interest at both a cognitive (or psychological) and neural level.

**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.

**Textbook**

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

Call number reserve at library using: **QP360.5 .E24 2016**

**Additional Readings**: Concepts discussed in lectures will refer to the reading assigned for that class period. Therefore, the reading associated with each class should be read prior to the class. The readings include (1) chapters from the assigned Postle textbook, (2) required articles and (3) suggested articles.

The required articles are sometimes literature reviews, and sometimes original, research papers. The level of these papers is often higher than that of the book chapters. The suggested articles may be even more advanced, and are intended for students who are particularly interested in the topic. All articles will be posted in the Class Files folder on Courseworks.

| Wk | Date | Lect # | Topic | Reading |
| --- | --- | --- | --- | --- |
| 1 | Jan 21 | 1 | What is Cognitive Neuroscience? | Chap 1 |
| 1 | Jan 23 | 2 | History and Principles of Neuroscience |  |
| 2 | Jan 28 | 3 | Functional Neuroanatomy | Chap 2 - 3 |
| 2 | Jan 30 | 4 | Methods I |  |
| 3 | Feb 4 | 5 | Methods II |  |
| 3 | Feb 6 | 6 | Perception I | Chap 5 |
| 4 | Feb 11 | 7 | Perception II | Tong paper |
| 5 | Feb 13 | 8 | *In Class Review*  |  |
| 6 | Feb 18 |  | **Quiz 1** |  |
| 7 | Feb 20 | 9 | Recognition | Haxby paper |
| 8 | Feb 25 | 10 | Motor Control | Chap 7 |
| 9 | Feb 27 | 11 | Attention I | Chap 8 |
| 10 | March 4 | 12 | Attention II | Moore paper |
| 11 | March 6 | 13 | Working Memory | Chap 9 |
| 12 | March 11 | 14 | Long Term Memory I | Chap 9 |
| 13 | March 13 | 15 | Long Term Memory II | Chap 9, Davachi paper |
|  | March 18/20 |  | Spring Break! |  |
| 14 | March 25 |  | *In Class Review* |  |
| 15 | March 27 |  | **Quiz 2** |  |
| 16 | April 1 | 16 | Non-declarative memory |  |
| 17 | April 3 | 17 | Sleep | Chap 10 |
| 18 | April 8 | 18 | Emotion | Chap 13 |
| 19 | April 10 | 19 | Social Cognition | Chap 15 |
| 20 | April 15 | 20 | Motivation and Reward | Chap 14 |
| 21 | April 17 | 21 | Mental Health | Pp 425-435, Chap 16 |
| 22 | April 22 | 22 |  |  |
| 23 | April 24 | 22 | *In Class Review* |  |
| 24 | April 29 |  | **Quiz 3** |  |
| 25 | May 1 |  | Final Review |  |

**Exams/Grading**

Grades will be based on 3 In-Class Quizzes, totaling 60% of your final grade and a Final Exam, worth 40%. For the three quizzes, they will contribute differentially to the 60%. Your best score will contribute the most and your worst score will contribute the least. (Your worst score will be 10%, best score 30% and the mid score will contribute 20%).

The In-class exams will cover material discussed in lectures and readings up to the date of each exam from the last exam (or from the first day of class, for the first exam). The final exam, scheduled for XXX, is cumulative and will cover material from the entire semester. All exams will be of the same format (will include multiple choice, definitions and short answer questions, and essays) although the final will be longer than the In-Class Quizzes.

You may NOT skip the final exam! Under no circumstances can you skip the Final Exam, and you cannot make up the Final exam with any other assignment. If you do not take the final, you will receive a 0 for 40% of your grade.

**Extra Credit Opportunities:**

**Paper (Up to 3 points)**: You should compare and contrast the results from TWO peer-reviewed research articles in cognitive neuroscience (e.g. newspaper articles are NOT peer reviewed; Blog posts are NOT peer reviewed). The paper must be on a topic that we discussed in class. The paper should be written for an intelligent lay-person. The maximum length is 3 pages, double spaced, 12-pt font with standard margins. We will stop reading after the 3rd page. Due last day of class. Please remember that everything you write has to be your own words, you cannot copy and paste text from the articles you are reading or count on AI to write this paper.

**Science Communication (up to 3 points)**: You can create a video or other media that shares a concept you learned in class for a wide audience (think TikTok)

**Fostering an Inclusive Classroom**: My aim is to foster a learning environment that supports a diversity of perspectives and experiences and honors your identities. Please reach out to me with any concerns or suggestions you may have to better address your learning needs and to improve the effectiveness of this course. I look forward to working together to create a classroom community built on mutual respect and inclusivity.

Students with special needs who may require classroom accommodations should make an appointment with me before or during the first week of class. You should also contact the Office of Disability Services (ODS) in Lerner Hall before the start of the course to register for these accommodations. The procedures for registering with ODS can be found at https://health.columbia.edu/content/disability-services or by calling (212) 854-2388.

**Promoting Wellness**: Many of us have periods in which our mental health and well-being suffer. I urge you to take care of yourselves – and of each other. Please prioritize your mental health and wellbeing and know that there are many resources available to you both within our classroom community and throughout the university:

https://health.columbia.edu/content/counseling-and-psychological-services http://blogs.cuit.columbia.edu/nightline/ https://universitylife.columbia.edu/student-resources-directory#health

**Ensuring Academic Integrity**: As members of this academic community, we are responsible for maintaining the highest level of personal and academic integrity, which includes presenting only our own work on assignments and exams. You can find detailed definitions and examples in Columbia University’s Guide to Academic Integrity: (http://www.college.columbia.edu/academics/academicintegrity).

Any questions of academic integrity will be automatically referred to Columbia’s office of Student Conduct and Community Standards. The semester progresses very quickly, and there is a lot of material to learn. If you find yourself in a situation – e.g., starting an assignment too late – in which it seems like the best option may be to violate your academic integrity, please see me. Together, we can work out a solution. It is far better to have a few points deducted from an assignment than to compromise your academic integrity and potentially put your academic standing at the university in jeopardy. Plagiarism—whether intentional or inadvertent—is a serious violation of academic integrity. If you have any questions about what constitutes plagiarism and/or how to properly cite sources, please come to me. I am more than happy to help.

***Letter Grade Assignment***

97-100: **A+** 94-96: **A** 90-93: **A-**

87-89: **B+** 84-86: **B** 80-83: **B-**

77-79: **C+** 74-76: **C** 70-73: **C-**

<69: **D**  <60: **F**