

COGNITIVE NEUROSCIENCE (PSY 449/549)

University of Oregon
Spring 2023

TR 10:00-11:20am ♦ MCK 129 ♦ 4 credits ♦ CRN: 35823, 35833

<http://canvas.uoregon.edu>



Instructor: Nicole Dudukovic, Ph.D.

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Office: Straub 387

Office Hours: Drop-in hour – Th 4-5pm in Straub 387

By appointment – Wed 12:30-2:30pm & Fri 11:30am-12:30pm

(sign up at <https://nicoledudukovic.youcanbook.me/> for an in-person or Zoom appointment)

If you can't make my scheduled office hours but would like to meet, please email me!

Teaching Assistant: Mahboubeh Khoddam

Email: mkhoddam@uoregon.edu

Office Hours: By appointment

Course Overview

Welcome to Cognitive Neuroscience! I am committed to making this a fun, engaging, and successful course for everyone, and I look forward to learning, questioning, and growing as a class community.

This course will examine how studies of neurological disorders and neuroimaging techniques are being used to gain insight into human mental processes, including object recognition, attention, memory, language, emotion, and cognitive control. We will consider dominant theories of the neural underpinnings of these cognitive processes and explore how research on typical and atypical neural processes has led to those theories. In addition to learning about classic research in cognitive neuroscience, you will read and critique empirical articles and discover how research in the field is transforming and enhancing our understanding of how the brain gives rise to the mind.

Required Reading

- ♦ All required readings are available as PDF files on Canvas.
- ♦ Sacks, O. (1998). *The Man Who Mistook His Wife for a Hat and Other Clinical Tales*. Touchstone Books. (Book available through the Duck Store; PDFs of required chapters available on Canvas).

Optional Reading

- ♦ Gazzaniga, M., Ivry, R.B., & Mangun, G.R. (2019). *Cognitive Neuroscience: The Biology of the Mind*. (5th Ed). New York, NY: W. W. Norton & Company.
(Available at Duck Store & on reserve at Knight Library; only buy this if you are planning a career as a cognitive neuroscientist and/or you are interested in learning more!))

Learning Outcomes

By the end of this course you should be able to:

- ♦ Identify major theories, research findings, and methodological approaches in cognitive neuroscience;
- ♦ Critically examine research in cognitive neuroscience and communicate your ideas clearly and effectively;
- ♦ Evaluate how cognitive neuroscience is reshaping our understanding of the human mind and brain.

Course Requirements

Reading Assignments

Tuesday reading assignments will usually consist of background readings (review articles or book chapters) on the week's topic, and Thursday reading assignments will be featured readings, typically chapters from the Sacks book, which sympathetically describe case histories of neurological disorders, as well as empirical articles, which will give you practice reading primary research articles in cognitive neuroscience. I will provide you with questions to guide your reading of the Sacks book and the empirical articles, which we will critically evaluate as a class and in small groups during our Thursday meetings. You should complete the assigned readings **before** class.

Exercises

You will be asked to complete required exercises on Canvas before most Tuesday class sessions. These are essentially ungraded quizzes that check your comprehension of recently presented course material and the assigned readings, sometimes including the background reading for that day's class. We will also go over the answers to the exercises in class on Tuesday. **Exercises are due on Canvas by the start of class on Tuesdays.** Although the exercises will not be assigned a grade based on accuracy, completion of the exercises counts for 10% of your grade in the class. Late exercises will be penalized 50%.

Discussion Posts

To facilitate class discussion, you will be required to post on the Canvas discussion forum before most Thursday class sessions (see Course Schedule). Your post can be a query, puzzle, or issue about the assigned reading that you would like to have discussed in class, or it can be a response to one of your classmate's posts. **Discussion questions/responses must be submitted on the Canvas discussion forum by the start of class on Thursdays.** Your diligence and thoughtfulness in meeting this requirement will count for 10% of your grade in this course. Late discussion posts will be penalized 50%.

Neurosynth Activity

During the second week of the term, we will be using Neurosynth (<https://neurosynth.org/>) to gain hands-on experience working with neuroimaging data. Class time will be devoted to working through this activity, and additional information will be provided in a separate handout. If you are absent during Week 2, I strongly encourage you to get in touch with me about this assignment. **Your completed Neurosynth activity is due on Canvas on Sunday, April 16.**

Exams

There will be one midterm and a final exam, each composed of multiple-choice and short-answer questions. **Both exams will be online (not in person) and open note (although you cannot consult classmates or the internet).** Exam questions will be based on material presented in class and material from the reading assignments, and they will require you to go beyond memorization to apply, analyze, and synthesize information. The final exam will not be cumulative, but it will presuppose general knowledge covered earlier in the course (e.g., knowing different brain areas and basic methodology). Unless otherwise stated, exams will be available starting at 8:00am until 11:59pm that same evening. Once you begin taking the exam you will have 80 minutes to complete it. Thus, although you have flexibility in terms of when in the day you take the exam, you should have the 80 minutes of class/exam time already set aside.

Case Study

For this assignment, you will select a neuropsychological case study, either from the Sacks book or from an empirical article, and research the neurological basis of the condition described in the case. You will summarize the most salient aspects of the case, describe the neurological basis of the condition along with typical symptoms and treatments, and discuss how the case contributes to our understanding of brain

function. Additional information about this assignment will be provided in a separate handout. **The case study assignment is due on Canvas on Sunday, May 28.**

Literature Critique Paper (Undergraduate students enrolled in PSY 449 ONLY)

The objective of the literature critique paper is for you to think critically and independently about cognitive neuroscience research and communicate your ideas effectively. You will carefully read one of the pre-selected empirical articles (available on Canvas), briefly summarize it, critique the methods and conclusions, and propose a thoughtful follow-up study. Papers should be 4-5 double-spaced pages. Additional information about this assignment will be provided in a separate handout. **Your literature critique paper is due on Canvas on Sunday, April 28.**

Research Proposal Paper (Graduate students enrolled in PSY 549 ONLY)

The research proposal will allow you to explore a research topic related to cognitive neuroscience in depth and propose a novel experiment to address an unanswered question. The proposal should include a literature review (going beyond the readings discussed in class), experimental design, predicted results, and a discussion of the study's implications. Research proposals should be approximately 10-12 pages (double-spaced) in APA format and include at least 10 references. More details will be provided in a separate handout.

Grading

Final grades in this course will be determined by the following:

- ◆ Exercises: 10%
- ◆ Discussion Posts: 10%
- ◆ Neurosynth Activity: 5%
- ◆ Midterm: 25%
- ◆ Critique Paper: 15%
- ◆ Case Study: 10%
- ◆ Final Exam: 25%

Grades will be distributed as follows:

		B+	87-89%	C+	77-79%	D+	67-69%
A	93-100%	B	83-86%	C	73-76%	D	60-66%
A-	90-92%	B-	80-82%	C-	70-72%	F	0-59%

Please see the psychology department guidelines for a description of the type of achievement that each grade signifies: <http://psychology.uoregon.edu/courses/department-grading-standards/>

Course Policies

Classroom Community Expectations

All members of this class (both students and instructor) can expect to:

Participate and Contribute: All students are expected to participate by sharing ideas and contributing to the learning environment. This entails preparing, following instructions, and engaging respectfully and thoughtfully with others.

Expect and Respect Diversity: All classes at the University of Oregon welcome and respect diverse experiences, perspectives, and approaches. What is not welcome are behaviors or contributions that undermine, demean, or marginalize others based on race, ethnicity, gender, sex, age, sexual orientation, religion, ability, or socioeconomic status. We will value differences and communicate disagreements with respect. We may establish more specific guidelines and protocols to ensure inclusion and equity for all members of our learning community.

Help Everyone Learn: Part of how we learn together is by learning from one another. To do this effectively, we need to be patient with each other, identify ways we can assist others, and be open-minded to receiving help and feedback from others. Don't hesitate to contact me to ask for assistance or offer suggestions that might help us learn better.

Absences

This is a face-to-face course. Attendance is important because we will develop our knowledge through in-class activities that require your active engagement. We'll have discussions, small-group activities, and do other work during class that will be richer for your presence, and that you won't be able to benefit from if you are not there. Excessive absences make it impossible to learn well and succeed in the course. While there is not an automatic grade deduction for missing classes, it is unlikely that students who miss more than 4 classes will be able to pass this course. Please take absences only when necessary, so when they *are* necessary, your prior attendance will have positioned you for success.

Artificial Intelligence Use

All work you submit for this course toward completion of course requirements must be your own original work done specifically for this course and without substantive assistance from others, including artificial intelligence systems (e.g., ChatGPT). Work you've completed for previous courses or are developing for other courses this term should not be submitted for this course. Please note that your work may be submitted to AI or plagiarism detection tools to ensure all work is human-created and original. Please also carefully read the academic integrity policy concerning plagiarism.

Academic Integrity

The University Student Conduct Code (available on the [Student Conduct Code and Procedures webpage](#)) defines academic misconduct. Students are prohibited from committing or attempting to commit any act that constitutes academic misconduct. By way of example, students should not give or receive (or attempt to give or receive) unauthorized help on assignments or examinations without express permission from the instructor. Students should properly acknowledge and document all sources of information (e.g. quotations, paraphrases, ideas) and use only the sources and resources authorized by the instructor. If there is any question about whether an act constitutes academic misconduct, it is the students' obligation to clarify the question with the instructor before committing or attempting to commit the act. Additional information about a common form of academic misconduct, plagiarism, is available at the Libraries' [Citation and Plagiarism page](#).

Access and Accommodations

The University of Oregon and I are dedicated to fostering inclusive learning environments for all students and welcomes students with disabilities into all of the University's educational programs. The Accessible Education Center (AEC) assists students with disabilities in reducing campus-wide and classroom-related barriers. If you have or think you have a disability (<https://aec.uoregon.edu/content/what-disability>) and experience academic barriers, please contact the AEC to discuss appropriate accommodations or support. Visit 360 Oregon Hall or aec.uoregon.edu for more information. You can contact AEC at 541-346-1155 or via email at uoaec@uoregon.edu.

Accommodations for Religious Observances

The University of Oregon respects the right of all students to observe their religious holidays, and will make reasonable accommodations, upon request, for these observances. If you need to be absent from a class period this term because of a religious obligation or observance, please fill out the [Student Religious Accommodation Request fillable PDF form](#) and send it to me within the first weeks of the course so we can make arrangements in advance.

Reporting Obligations

I am an assisting employee. For information about my reporting obligations as an employee, please see [Employee Reporting Obligations](#). Students experiencing sex-based or gender-based discrimination, harassment, or violence, should call the 24-7 hotline 541-346-SAFE [7244] or visit safe.uoregon.edu for help. Students experiencing all forms of prohibited discrimination or harassment may contact the Dean of Students Office (541-346-3216) or the non-confidential Title IX Coordinator/OICRC at 541-346-3123. Additional resources are available at [UO's How to Get Support webpage](#).

I am also a mandatory reporter of child abuse. Please find more information at [Mandatory Reporting of Child Abuse and Neglect](#).

Academic Disruption due to Campus Emergency

In the event of a campus emergency that disrupts academic activities, course requirements, deadlines, and grading percentages are subject to change. Information about changes in this course will be communicated as soon as possible by email, and on Canvas. If we are not able to meet face-to-face, students should immediately log onto Canvas and read any announcements and/or access alternative assignments. Students are also expected to continue coursework as outlined in this syllabus or other instructions on Canvas.

In the event that the instructor of this course has to quarantine, this course may be taught online during that time.

Inclement Weather

It is generally expected that class will meet unless the University is officially closed for inclement weather. If it becomes necessary to cancel class while the University remains open, this will be announced on Canvas and by email. Updates on inclement weather and closure are also communicated as described on the Inclement Weather webpage.

Course Schedule

**The course schedule may change, but exam dates will not change unless absolutely necessary.*

Week	Date	Topic	Reading	Assignments
1	Tu 4/4	Course introduction & methods introduction		
	Th 4/6	Methods	Ruff & Huettel (2014)	
2	Tu 4/11	Neurosynth		Exercise 1
	Th 4/13		Sacks Ch. 15 Semendeferi et al. (2002)	Discussion 1
	Su 4/16	Neurosynth activity due		*Neurosynth activity due*
3	T 4/18	Object recognition	Behrmann & Vida (2018)	Exercise 2
	R 4/20		Sacks Ch. 1 Gauthier et al. (2000)	Discussion 2
4	T 4/25	Attention	Chun & Wolfe (2001)	Exercise 3
	R 4/27		Sacks Ch. 4 & 8 Neville et al. (2013)	Discussion 3
	Su 4/30	Paper due		*Critique paper due*
5	T 5/2	Memory	Squire & Wixted (2011)	Exercise 4
	R 5/4		Sacks Ch. 2 Squire et al. (2010) Race et al. (2011)	Discussion 4
6	T 5/9	Midterm		*Midterm*
	R 5/11	Hemispheric specialization	Gazzaniga (2000)	
7	T 5/16	Language	Martin (2003)	Exercise 5
	R 5/18		Sacks Ch. 9 Bedny et al. (2012)	Discussion 5
8	T 5/23	Emotion	Phelps (2006)	Exercise 6
	R 5/25	Undergraduate Research Symposium		Discussion 6
	Su 5/28	Paper due		*Case study due*
9	T 5/30	Cognitive control	Miller & Cohen (2001)	Exercise 7
	R 6/1		Sacks Ch. 13 Ophir et al. (2009)	Discussion 7
10	T 6/6	Decision making	Ruff & Fehr (2014)	Exercise 8
	R 6/8		Sacks Ch. 19 McClure et al. (2004)	Discussion 8
11	M 6/12 8:00am	Final exam		*Final exam*

Reading List

All of the following readings are posted on Canvas. Please see Course Schedule for reading assignments.

- Bedny, M., Caramazza, A., Pascual-Leone, A., Saxe, R. (2012). Typical neural representations of action verbs develop without vision. *Cerebral Cortex*, 22, 286-293.
- Behrmann, M., and Vida, M. (2018). Visual object recognition. In *Stevens' handbook of experimental psychology and cognitive neuroscience* (Vol. 1, pp. 491-527). New York, NY: John Wiley & Sons.
- Chun, M.M., and Wolfe, J.M. (2001). Visual attention. In E.B. Goldstein (Ed.), *Blackwell handbook of sensation and perception* (pp. 272-310). Oxford, UK: Blackwell Publishing Ltd.
- Gauthier, I., Skudlarski, P., Gore, J. C., and Anderson, A. W. (2000). Expertise for cars and birds recruits brain areas involved in face recognition. *Nature Neuroscience*, 3, 191-197.
- Gazzaniga, M.S. (2000). Cerebral specialization and interhemispheric communication: Does the corpus callosum enable the human condition? *Brain*, 123, 1293-1326.
- Martin, R. C. (2003). Language processing: Functional organization and neuroanatomical basis. *Annual Review of Psychology*, 54, 55-89.
- McClure, S. M., Li, J., Tomlin, D., Cypert, K. S., Montague, L. M., & Montague, P. R. (2004). Neural correlates of behavioral preference for culturally familiar drinks. *Neuron*, 44, 379-387.
- Miller, E. K., & Cohen, J. D. (2001). An integrative theory of prefrontal cortex function. *Annual Review of Neuroscience*, 24, 167-202.
- Neville, H. J., Stevens, C., Pakulak, E., Bell, T. A., Fanning, J., Klein, S., & Isbell, E. (2013). Family-based training program improves brain function, cognition, and behavior in lower socioeconomic status preschoolers. *Proceedings of the National Academy of Sciences*, 110, 12138-12143.
- Ophir, E., Nass, C., & Wagner, A. D. (2009). Cognitive control in media multitaskers. *Proceedings of the National Academy of Sciences*, 106, 15583-15587.
- Phelps, E. A. (2006). Emotion and cognition: Insights from studies of the human amygdala. *Annual Review of Psychology*, 57, 27-53.
- Race, E., Keane, M. M., & Verfaellie, M. (2011). Medial temporal lobe damage causes deficits in episodic memory and episodic future thinking not attributable to deficits in narrative construction. *Journal of Neuroscience*, 31, 10262-10269.
- Ruff, C. C., & Fehr, E. (2014). The neurobiology of rewards and values in social decision making. *Nature Reviews Neuroscience*, 15, 549-562.
- Ruff, C. C., & Huettel, S. A. (2014). Experimental methods in cognitive neuroscience. In P. W. Glimcher & E. Fehr (Eds.), *Neuroeconomics: Decision making and the brain*. Amsterdam: Academic Press, 77-108.
- Semendeferi, K., Lu, A., Schenker, N., & Damasio, H. (2002). Humans and great apes share a large frontal cortex. *Nature Neuroscience*, 5, 272-276.

Squire, L. R., van der Horst, A. S. McDuff, S. G. R., Frascino, J. C., Hopkins, R.O., & Mauldin, K. N. (2010). Role of the hippocampus in remembering the past and imagining the future. *Proceedings of the National Academy of Sciences, 107*, 19044-19048.

Squire, L. R., & Wixted, J. T. (2011). The cognitive neuroscience of human memory since H.M. *Annual Review of Neuroscience, 34*, 259-288.