**COGNITIVE NEUROSCIENCE (PSY 449/549)**

**University of Oregon**
**Winter 2019**
**MW 10:00-11:20am ♦ ED 117 ♦ 4 credits ♦ CRN: 26818, 26819**
**http://canvas.uoregon.edu**

**Instructor**: Nicole Dudukovic, Ph.D.
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**Office Hours:** Thursdays 1:30-3:30pm, and by appointment

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**Required Reading**

- Sacks, O. (1998). *The Man Who Mistook His Wife for a Hat and Other Clinical Tales.* Touchstone Books. (Available at the Duckstore & on reserve at Knight Library).
- All other required readings are available as PDF files 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 Duckstore & on reserve at Knight Library)

**Course Overview**

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.

**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.

**Student Workload**

When you complete this course, you will earn 4 credits toward your degree. Four credits are the equivalent of 120 hours of work across the term, or 12 hours per week for 10 weeks. You will spend 3 hours in class each week. The other 9 hours will be spent completing reading assignments, posting on the discussion forum, studying for quizzes and exams, and working on your critique paper and case study assignments. Most weeks you should plan to spend about 6 hours on reading and quiz preparations. Your workload will increase when you are studying for the midterm and the final exam, and when you are working on your written assignments.

**Course Requirements**

Reading Assignments

You should complete the assigned readings ***before*** coming to class. Reading assignments will consist of background readings (review articles or book chapters) on the week's topic or they will include chapters from the Sacks book, which sympathetically describe case histories of neurological disorders, and empirical articles, which provide 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.

Discussion Posts

To facilitate class discussion, you will be required to post on the Canvas discussion forum before most Wednesday 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 8pm the day before our class meets.** Your diligence and thoughtfulness in meeting this requirement, along with your regular attendance and participation in class, will count for 10% of your grade in this course. There are no make-ups for missed discussion posts.

Quizzes

Short quizzes will be given at the beginning of most Monday class sessions (see Course Schedule). Quizzes will consist of multiple-choice questions that pertain to recently presented course material and the assigned readings. Questions will sometimes be drawn from readings that have been assigned but have not yet been discussed in class (even those due the day of the quiz); however, these questions will be of a more general nature and should be easily answered if you have read the material. Of the seven quizzes, the two with the lowest scores will be dropped, with the average score of the remaining five yielding 15% of your final grade. ***No make-up quizzes will be offered***; if you miss a quiz, that grade will be one of the two that will be dropped.

Exams

There will be one midterm and a final exam, each composed of multiple-choice and short-answer questions. Exam questions will be based on material presented in class and material from the reading assignments, and will require you to go beyond memorization to apply, analyze, and synthesize information. The final exam will not be cumulative. ***Make-up exams are not permitted except in documented emergency situations.***

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 Friday, March 1.** Late assignments will be penalized one letter grade per day late, in fairness to those who submit on time.

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 Friday, February 1.** Late papers will be penalized one letter grade per day late.

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:

- Participation: 10%
- Quizzes: 10%
- Midterm: 25%
- Critique Paper: 15%
- Case Study: 15%
- 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/

**Class Policies**

Classroom Behavior
Please arrive on time for class, and stay for the duration of the class period. Turn off cell phones and any electronic devices that might be distracting to others. I support and value diversity, and expect you to respect the diversity of backgrounds, opinions, and viewpoints of your classmates.

Academic Integrity
**All work submitted in this course must be your own.** Violations will be taken very seriously and are noted on student disciplinary records. If you have any questions about what constitutes academic dishonesty, please ask! For more information about academic misconduct, see the University Student Conduct Code at http://dos.uoregon.edu/conduct.

For written assignments, you must cite all of your sources. Whenever you refer to an idea that is not your own, whether it is a quotation or you are paraphrasing, you must cite and reference the source. If you are unsure about what constitutes plagiarism, please ask! The UO library website also has a helpful page on avoiding plagiarism: http://researchguides.uoregon.edu/citing-plagiarism.

Accessible Education Center (AEC)
If you have a documented disability and anticipate needing accommodations in this course, please notify me as soon as possible. Also, please request that a counselor at the Accessible Education Center (uoaec@uoregon.edu, 541-346-1155) send a letter verifying the type of accommodation that is appropriate. For a list of resources provided by the Accessible Education Center, please see http://aec.uoregon.edu.

Students for Whom English is a Second Language
If you are a non-native English speaker and think you may have trouble in this course due to language difficulties, please see me as soon as possible to make any necessary special arrangements.

**Course Schedule**

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

| Week | Date | Topic | Reading | Quizzes/Assignments |
|---|---|---|---|---|
| 1 | M 1/7 | Course introduction & methods introduction | | |
| | W 1/9 | Cognitive neuroscience methods | Ruff & Huettel (2014)<br>Dobbs (2005)<br>http://www.pbs.org/wnet/brain/scanning/ | Getting to know you (Canvas survey) |
| 2 | M 1/14 | | Sacks Ch. 15<br>Semendeferi et al. (2002) | **Discussion Q1** (due by 8pm on Sunday) |
| | W 1/18 | Object recognition | Gauthier & Tarr (2016) | **Quiz 1** |
| 3 | M 1/21 | MLK Jr. Day – No class | | |
| | W 1/23 | | Sacks Ch. 1<br>Gauthier et al. (2000) | **Discussion Q2** (due by 8pm on Tuesday) |
| 4 | M 1/28 | Attention | Driver (2001)<br>Corbetta & Shulman (2002) | **Quiz 2** |
| | W 1/30 | | Sacks Ch. 4 & 8<br>Neville et al. (2013) | **Discussion Q3** (due by 8pm on Tuesday) |
| | F 2/1 | **Paper due** | | ***Critique paper due*** |
| 5 | M 2/4 | Memory | Squire & Wixted (2011) | **Quiz 3** |
| | W 2/6 | | Sacks Ch. 2<br>Squire et al. (2010)<br>Race et al. (2011) | **Discussion Q4** (due by 8pm on Tuesday) |
| 6 | M 2/11 | **Midterm** | | ***Midterm*** |
| | W 2/13 | Hemispheric specialization | Gazzaniga (2000) | |
| 7 | M 2/18 | Language | Martin (2003) | **Quiz 4** |
| | W 2/20 | | Sacks Ch. 9<br>Bedny et al. (2012) | **Discussion Q5** (due by 8pm on Tuesday) |
| 8 | M 2/25 | Cognitive control | Miller & Cohen (2001) | **Quiz 5** |
| | W 2/27 | | Sacks Ch. 13<br>Ophir et al. (2009) | **Discussion Q6** (due by 8pm on Tuesday) |
| | F 3/1 | **Paper due** | | ***Case study due*** |
| 9 | M 3/4 | Decision making | Ruff & Fehr (2014) | **Quiz 6** |
| | W 3/6 | | Sacks Ch. 19<br>McClure et al. (2004) | **Discussion Q7** (due by 8pm on Tuesday) |
| 10 | M 3/11 | Emotion | Phelps (2006) | **Quiz 7** |
| | W 3/13 | Recap & review | | |
| 11 | T 3/19 10:15a | **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.

Corbetta, M., & Shulman, G. L. (2002). Control of goal-directed and stimulus-driven attention in the brain. *Nature Reviews Neuroscience, 3*, 201-215.

Dobbs, D. (2005). Fact or phrenology? *Scientific American Mind*, 24-32.

Driver, J. (2001). A selective review of selective attention research from the past century. *British Journal of Psychology, 92*, 53-78.

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.

Gauthier, I., & Tarr, M. J. (2016). Visual object recognition: do we (finally) know more now than we did? *Annual Review of Vision Science, 2,* 377-396.

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, 10*6, 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: Akademic 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.