

**PSY 370 – COGNITIVE NEUROSCIENCE
GRAND VALLEY STATE UNIVERSITY
WINTER, 2020**

Section 01: TR 2:30 pm - 3:45 pm, 2302 Au Sable Hall

INSTRUCTOR: Joel Quamme, Ph. D.
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OFFICE HOURS: TR 1:00 pm – 2:15pm, or by appointment

REQUIRED TEXT:

Ward, J. (2015). *A Student's Guide to Cognitive Neuroscience*. 3rd ed. New York, NY: Taylor & Francis. ISBN-13: 9781848722729

Additional article readings will be made available on Blackboard.

PREREQUISITES:

Completion of Psychology 101 (Introduction to psychology) and Junior standing or higher.

COURSE DESCRIPTION

Cognitive Neuroscience seeks to explain how the brain gives rise to the functions of the mind. This class will explore the neural basis of higher cognitive processes, including object recognition, attention, memory, language, and executive control, as well as interactions among cognition, emotion, and social processes. The course emphasizes contemporary theories of how cognitive processes are implemented in the brain, and the findings of empirical research into brain-cognition relationships.

Students will be introduced to the wide variety of methods used by cognitive neuroscientists to understand the brain substrates of cognition, including studies of patients with neuropsychological impairments, functional imaging and electrophysiological recording of brain activity during cognitive performance, electrical and magnetic stimulation of brain regions, computational modeling of neural systems, and the analysis of behavioral performance. We will critically examine how cognitive neuroscientists use these methods to draw inferences about the neural basis of cognition, and how the findings of cognitive neuroscience research are presented to the public.

Class periods will consist principally of lecture and discussions, as well as short activities and videos to demonstrate cognitive phenomena and their neural correlates. Students will be evaluated according to their performance on exams, two short papers, and on their completion of several assignments based on article readings.

COURSE OBJECTIVES

My goal is that by the end of the course, students will be able to:

- Identify the historical roots of the modern study of cognitive neuroscience, including major philosophical and scientific developments.
- Describe the modern methods of cognitive neuroscience, analyze their strengths and weakness, and evaluate their application to different kinds of research problems.
- Analyze contemporary theories and evidence of the neural bases of core cognitive processes, including attention, memory, language and higher cognitive processes.
- Comprehend primary literature on the neural basis of cognition, and draw scientific conclusions from data of cognitive neuroscience studies.
- Critically evaluate claims about the neural basis of cognitive phenomena, such as those encountered in popular media.

READINGS

Students will be responsible for reading the assigned textbook chapter or article for each class topic ***before*** the day on which they are scheduled. Several additional articles will also be assigned and made available on blackboard. Most of these articles are peer-reviewed research papers reporting experimental data on some aspect of cognitive neuroscience (e.g., attention, language). We'll use the article readings for short written assignments and discuss them in class (see "Article Assignments below). All assigned readings from the textbook and article assignments will be fair game for exams. Thus, it is likely that ***your grade will suffer if you do not keep up with the assigned reading.***

GRADING

Grades will be computed based on your performance on 3 exams, 5 assignments, and two short papers according to the following breakdown:

	Points	Percent
3 Exams:	180 (60 each)	60.0%
5 Article Assignments	40 (8 each)	13.3%
2 Short Papers	80 (40 each)	26.7%

Grading scale. The percentage of total credit you earn will be converted to letter grades according to the following scheme:

A	100-94	A-	90-93	B+	87-89	B	83-86
B-	80-82	C+	77-79	C	73-76	C-	70-72
D+	67-69	D	60-66	F	59 or lower		

EXAMS

There will be three ***non-cumulative*** exams, each worth 20% of your grade (for a total of 60%). The exams will contain a mix of multiple choice and other formats such as short answer, completion, and labelling. The material tested on exams will come from assigned textbook readings, lecture material, and from the article assignments.

ASSIGNMENTS

Article assignments involve reading assigned articles outside of class and answering some questions about them. The article readings and assignment questions will be posted on blackboard at least one week before they are due. There are 6 class meetings on the schedule that have an article assignment due (these are the dates on the schedule where an article assignment is indicated in bold). To complete the assignment, type answers to each of the questions, and turn in a hard copy. Of the 6 article assignments, I'll count 5 of them toward your grade, so you can skip one of the assignments without penalty. If you do all 6, I will count your 5 best scores. **I will not accept e-mailed assignments -- you must turn in a physical copy to get credit.**

SHORT PAPERS

The purpose of the short papers is to gain experience locating, reading, critically evaluating, and synthesizing research findings in cognitive neuroscience. Each paper will require you to choose a topic or issue within the field of cognitive neuroscience, broadly defined, and locate **two** related articles that fall under the same topic. Both articles must be primary peer-reviewed research, must report original data (no reviews or chapters). Your two short papers must be on different topics and must use a different pair of articles. Each short paper should contain about 5 pages of text, double-spaced. The paper should introduce the major issue addressed by the two articles, give a brief description of the methods and results of each article, and contain a discussion of how the two articles relate to one another. Detailed information about the short papers will be provided in class.

PLAGIARISM

According to the 2008/9 GVSU Student Code, Section 223.01: "Any ideas or material taken from another source for either written or oral presentation must be fully acknowledged. Offering the work of someone else as one's own is plagiarism. The language or ideas taken from another may range from isolated formulas, sentences, or paragraphs to entire articles copied from books, periodicals, speeches or the writings of other students. The offering of materials assembled or collected by others in the form of projects or collections without acknowledgment also is considered plagiarism. Any student who fails to give credit in written or oral work for the ideas or materials that have been taken from another is guilty of plagiarism." **Detected plagiarism may result in a grade of 0% on any paper or assignment on which it occurs, and possibly an F in the course. You have been warned.**

EMERGENCY CLOSINGS

If for any reason the university cancels class on an exam day (e.g., severe weather), the exam will be moved to the next class meeting.

ELECTRONIC DEVICES

Please turn all cell phones, pagers and other electronic devices with audible signals or alarms OFF during class time.

ACCOMODATION FOR DISABILITY

Any student in this class who has special needs because of a learning, physical, or other disability, please contact me or Disability Support Resources (DSR) at 331-2490. Furthermore, if you have a physical disability and think you will need assistance evacuating this classroom and/or building in an emergency situation, please make me aware so I can develop a plan to assist you.

CLASS SCHEDULE

The following schedule of class topics, reading assignments and due dates is tentative, and may need to be modified later in the course. Any changes to the schedule will be announced in class and on blackboard. Exam dates will not change unless class is cancelled on the date of the exam.

Week	Date	Class Topic	Reading / Assignment due
1	T 1/7	Course Orientation	SYLLABUS
	R 1/9	Historical & philosophical foundations I	WARD, CH 1
2	T 1/14	Historical & philosophical foundations II	Article assignment 1: Dennett, 1978
	R 1/16	Neurons & neuroanatomy I	WARD, CH. 2 (15-23)
3	T 1/21	Neuroanatomy II	WARD, CH. 2 (24-30)
	R 1/23	Functional specialization and modularity	Article assignment 2: Ramachandran, 2004
4	T 1/28	Brain lesions and stimulation	WARD, CH. 5 (81-93; 95-98, 103-106)
	R 1/30	Cognitive electrophysiology	WARD, CH. 3
5	T 2/4	Cognitive neuroimaging	WARD, CH. 4 (49-59; 66-79)
	R 2/6	EXAM 1	
6	T 2/11	Object recognition I	WARD, CH. 6 (115-134)
	R 2/13	Object recognition II	Article assignment 3: Haist et al., 2010
7	T 2/18	Attention I	WARD, CH. 7
	R 2/20	Attention II	Article assignment 4: Saj et al., 2018
8	T 2/25	Short-term memory	WARD, CH. 9 (195-202)

	R 2/27	Long-term memory I	WARD, CH. 9 (203-210) Short paper 1 Due
9	3/2-3/6	SPRING BREAK	
10	T 3/10	Long-term memory II	WARD, CH 9 (210-229)
	R 3/12	Hemispheric lateralization of cognition I	
11	T 3/17	EXAM 2	
	R 3/19	Hemispheric lateralization of cognition II	
12	T 3/24	Speech and language processing I	WARD, CH. 10 (249-257)
	R 3/26	Speech and language processing II	WARD, CH. 11
13	T 3/31	Speech and language processing III	Article assignment 5 (Marinkovic et al., 2011)
	R 4/2	Executive control I	WARD, CH. 14
14	T 4/7	Executive control II	
	R 4/9	Emotion processing I	WARD CH. 15 (373-392)
15	T 4/14	Emotion processing II	Article assignment 6 (Filmer & Monsell, 2013)
	R 4/16	Social cognition	WARD CH. 15 (392-406) Short Paper 2 Due
Finals Week	4/23 Thursday, 2:00pm-3:50pm		EXAM 3

ARTICLE ASSIGNMENT READINGS AND DUE DATES

Here are the articles we will read and use for article assignments, and. These are also tentative; I may choose to replace one or more of them with a different article as we go. If that happens, I'll announce it in class and on blackboard, and I'll make the replacement reading available.

1/14 Dennett, D. K. (1978). Where Am I? In D. K. Dennett (Ed.) *Brainstorms* (pp. 310-323). Cambridge MA: MIT Press.

1/23 Ramachandran, V. S. (2005). A Pain In The Brain. *A Brief Tour of Human Consciousness* (pp. 1-23). New York: Pi Press.

- 2/13 Haist F., Lee, K., & Stiles, J. (2010). Individuating faces and common objects produces equal responses in putative face-processing areas in the ventral occipitotemporal cortex. *Frontiers in Human Neuroscience*, 4(181), doi: 10.3389/fnhum.2010.00181.
- 2/20 Saj, A., Vardon, V., Hauber, C-A., Vuilleumier, P. (2018) Dissociable components of spatial neglect associated with frontal and parietal lesions. *Neuropsychologia*, 115, 60-9.
- 3/31 Marinkovic, K., Baldwin S., Courtney, M. G., Witzel, T., Dale, A. M., & Halgren, E. (2011). Right hemisphere has the last laugh: neural dynamics of joke appreciation. *Cognitive, Affective, & Behavioral Neuroscience*, 11, 113-130.
- 4/14 Filmer, H. L. & Monsell, S. (2013). TMS to V1 spares discrimination of emotive postures relative to neutral body postures. *Neuropsychologia*, 51, 2485-2491.