PSY 370 – COGNITIVE NEUROSCIENCE
GRAND VALLEY STATE UNIVERSITY
WINTER, 2017

Section 01: TR 1:00 pm - 2:15 pm, D1123 Mackinac Hall

INSTRUCTOR: Joel Quamme, Ph. D.
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OFFICE HOURS: TR 11:30 am – 12:45pm, or by appointment

REQUIRED TEXT:

Gazzaniga, M., Ivry, R. B., & Mangun, G. R. (2013). *Cognitive neuroscience: the Biology of the mind.* 4th ed. New York: Norton. ISBN-13: 9780393913484

Additional readings are available on Blackboard and course reserve

PREREQUISITES:

Psychology 101 (Introduction to psychology) is a prerequisite for this course

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 the social world. The course emphasizes contemporary theories of how the 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 neuropsychological impairments, functional imaging of the brain in action, electrophysiological recordings of neural activity, 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 cognitive neuroscience research is represented 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 short assignments based on outside 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 the topic is scheduled (see class schedule below). Additional article readings are assigned most weeks and will be available on course reserve or blackboard. Most of these articles are peer-reviewed research papers reporting experimental data on some aspect of cognitive neuroscience (e.g., memory, object recognition, language). We'll use the article readings for class discussions and short assignments (see "Article Assignments below). All assigned readings 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, 9 article assignments, and two short papers according to the following breakdown:

3 exams: 75%
9 article assignments 9%
2 short Papers: 16%

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 25% of your grade (for a total of 75%). The exams will contain 60 multiple choice questions. The material tested on exams will come from the lectures, textbook, additional articles, and discussions.

ARTICLE ASSIGNMENTS

Article assignments involve reading assigned articles outside of class and answering a few questions about them. Over the duration of the course, there will be 11 class meetings where we discuss a narrow contemporary issue within cognitive neuroscience (these are the *italicized entries* in the schedule below). On these days there will be an article you need to read before class relating to the discussion that day. For each article, I will give you a few brief questions to answer. Type up your answers and bring two copies of your answers; turn in one copy to me at the beginning, and keep one copy yourself for your own reference in class. Of the 11 assignments, I'll count 9 of them toward your grade, so you can skip two without penalty. If you complete more than 9, I'll count your 9 best scores. The article readings and assignment questions will be posted on blackboard at least one week before they are due. ***I will not accept e-mailed assignments -- you must turn in a physical copy to get credit.***

SHORT PAPERS

Sixteen percent of the total grade will come from two short papers (8% each). 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 be about 4-5 pages in length, double-spaced, and 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, including due dates, 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

Pleas 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 and reading assignments for each day and book chapters is tentative, and will probably 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.

Days with class topics in CAPS focus on the general background of the topic, organized around a book chapter. Days with class topics listed in *italics* will continue the topic from the previous day, but will additionally zoom in on a narrow issue related to topic. There is an article assignment due on each of these days based on the specific article reading scheduled for that day.

Week	**Date**	**Class Topic**	**Reading / article assignment due**
1	T 1/10	COURSE ORIENTATION	Syllabus
	R 1/12	ROOTS OF COGNITIVE NEUROSCIENCE	Ch. 1
2	T 1/17	*Functionalism and Physicalism*	*Dennett, 1978*
	R 1/19	NEUROANATOMY I	Ch. 2 (23-35, 37-42)
3	T 1/24	NEUROANATOMY II	Ch. 2 (43-59)
	R 1/26	*Is the brain composed of functional modules?*	*Ramachandran, 2005*
4	T 1/31	METHODS I	Ch. 3 (71-90)
	R 2/2	METHODS II	Ch. 3 (91-117)
5	T 2/7	*What do brain activations tell us?*	*Beck, 2010*
	R 2/9	**EXAM 1**	**(Ch. 1, 2, 3)**
6	T 2/14	OBJECT RECOGNITION	Ch. 6
	R 2/16	*Is there a specialized brain region for face processing?*	*Haist et al., 2010*
7	T 2/21	ATTENTION	Ch. 7
	R 2/23	*Does socioeconomic disparity affect attention?*	*Kishiyama et al., 2009*
8	T 2/28	MEMORY	Ch. 9
	R 3/2	*How does sleep affect memory consolidation?*	*Westerberg et al., 2015*
9	3/5-3/12	**SPRING BREAK**	
10	T 3/14	EMOTION	Ch. 10

	R 3/16	*Are there multiple routes for visual emotion processing?*	*Filmer & Monsell, 2013*
11	**T 3/21**	**EXAM 2**	**(Ch. 6, 7, 9 and 10)**
	R 3/23	HEMISPHERIC SPECIALIZATION	Ch. 4
12	T 3/28	*What is the right hemisphere's role in language?*	*Marinkovic et al., 2011*
	R 3/30	LANGUAGE	Ch. 11
13	T 4/4	*How are the language areas networked?*	*Chai et al. 2016*
	T 4/6	**NO CLASS**	
14	T 4/11	COGNITIVE CONTROL	Ch. 12
	R 4/13	*Does internally-directed thought rely on "default mode" regions?*	*Bertossi & Ciaramelli 2016*
15	T 4/18	SOCIAL COGNITION	Ch. 13
	R 4/20	*Does understanding animate others depend on a mirror neuron system?*	*Wheatley et al., 2007*
Finals Week	**4/24 Monday, 12:00pm-1:50pm**		**EXAM 3 (Ch. 4, 11, 12, 13)**

ARTICLE READINGS

Here are the articles we'll read and use for article assignments. 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.

1/17 Dennett, D. K. (1978). Where Am I? In D. K. Dennett (Ed.) *Brainstorms* (pp. 310-323). Cambridge MA: MIT Press.

1/26 Ramachandran, V. S. (2005). A Pain In The Brain. *A Brief Tour of Human Consciousness* (pp. 1-23). New York: Pi Press.

2/7 Beck, D. M. (2010). The appeal of the brain in the popular press. *Perspectives on Psychological Science, 5,* 762-766.

2/16 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.

2/23 Kishiyama, M. M., Boyce, W. T., Jimenez, A. M., Perry, L. M., & Knight, R. T. (2009). Socioeconomic disparities affect prefrontal function in children. *Journal of Cognitive Neuroscience, 21,* 11-6-1115

3/2 Westerberg, C. E., Floczak, S. M., Weintraub, S., Mesulam, M.-M, Marshall, L., Zee, P. C., & Paller, K. A. (2015). Memory improvement via slow-oscillatory stimulation during sleep in older adults. *Neurobiology of Aging, 36,* 2577-2586.

3/16 Filmer, H. L. & Monsell, S. (2013). TMS to V1 spares discrimination of emotive postures relative to neutral body postures. *Neuropsychologia, 51,* 2485-2491.

3/28 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.

4/4 Chai, L.R., Mattar, M. G., Blank, I. A., Fedorenko, E., & Bassett, D. S. (2016). Functional network dynamics of the language system. *Cerebral Cortex, 26,* 4148-4159.

4/13 Bertossi, E., & Ciaramelli, E. (2016). Ventromedial prefrontal damage reduces mind-wandering and biases its temporal focus. *Social Cognitive and Affective Neuroscience, 11,* 1783-1791

4/20 Wheatley, T., Milleville, S. C., & Martin, A. (2007). Understanding animate agents. Distinct roles for the social network and mirror system. *Psychological Science, 18,* 469-474.