Psychology 194-02: INTRO TO COGNITIVE SCIENCE, *Fall 2018*

INSTRUCTOR: Jeffrey K. Bye, Ph.D.

CLASS TIME AND LOCATION: M/W/F 12:00pm–1:00pm, OLRI 352

OFFICE HOURS: M/W/F 1:00pm-2:00pm, OLRI 359D

CLASS RESOURCES: https://moodle.macalester.edu/course/view.php?id=2965

DISCUSSION FORUM: http://piazza.com/macalester/fall2018/psyc19402

COURSE OVERVIEW

This course is intended to present a broad but engaging introduction to the highly interdisciplinary field of cognitive science, encompassing research from the disciplines of psychology, philosophy, neuroscience, linguistics, anthropology, and artificial intelligence. Cognitive science is more than the sum of these parts, however, as it is unified by a theoretical model of the mind as an information processor, with cognitive scientists' goal to discover the systems of representation and operation that characterize mental processes. Because the content covered in cognitive science is vast, we will explore and expand on overarching themes, methods, and approaches as we take deep dives into specific topics, such as the nature of thinking, reasoning, and language. Required reading will consist of primary sources, with optional supplemental material, and classes will consist of a mixture of lecture and discussion.

While the structure of the course splits up topic areas across different lectures, we will focus throughout on fundamental questions of cognitive science:

> *How do minds process the world? How do minds acquire, revise, and represent information? How do minds utilize information to guide thought and action?*

As much as possible, we will also discuss how cognitive science operates as a *science*:

> *How can we observe and quantify the mind? What are the strengths and weaknesses of experiments? Of neuroimaging? Of models and theories?*

Keep these questions 'in mind' throughout this course to guide your learning.

COURSE-RELATED CORRESPONDENCES

If you have a question or concern about the class that is personal in nature, you may contact me directly at jbye@macalester.edu (please include "194" in the subject line), but otherwise please post *all course correspondence* (clarificatory, conceptual, or otherwise) to our **class discussion forum:** http://piazza.com/macalester/fall2018/psyc19402.

The goal of using this forum is to encourage you to discuss the material with each other. Studies show that asking and answering questions with peers is a great way to assess and strengthen your own understanding of the material. The use of this forum will maintain equity across students by providing all students with access to the same information.

READINGS

We will **not** use a textbook for this course. There are multiple cognitive science textbooks that are worth reading; however, it is my belief that the best way to approach such a broad field is to read classic papers and primary sources from various disciplines.

As such, the required reading for this course will consist of **primary sources** for each class meeting. I will post each required reading on the course website (Moodle).

This is a sophisticated course. The main readings are from primary or advanced sources, which are typically written for a more experienced audience than an intro-level textbook. The reading assignments associated with a given day should be read ***before*** *that day's lecture*. Simply skimming an article will not be sufficient. Please plan ahead and give yourself time to read the assigned materials, reflect on them, and submit reading responses (see below). Re-reading after class (especially after a delay) will also help you to consolidate the material and make connections to other readings.

The goal of pre-reading is to help provide context and introduce terms that will facilitate learning in lecture, and it will also help you during the weekly quizzes.

POPULAR MEDIA RESOURCES

Because cognitive science is so fascinating, its topics are often covered in popular media, such as news articles, blog posts, podcasts, TV & movies, and online videos. As such, I will try to supplement our academic reading and discussion with these resources. Though you will not be tested directly on information presented in these popular media resources (unless it also appears in lecture or required readings), I *strongly* suggest that you read/watch/listen to them, as I have tried to select resources that are especially engaging, thought- and discussion-provoking, and/or informative.

The goals of including popular media resources are to 1) provide a more accessible (though often simplified) introduction to a topic, which may make the primary reading easier to digest, and 2) to allow us to have a critical discussion about how academic and scientific knowledge is disseminated to and discussed by popular media.

GRADING BREAKDOWN

Reading Responses	**10%**	(25 required; 0.4% each)
Weekly Quizzes	**10%**	(12 total; 1% each; lowest 2 dropped)
Paper Critique	**30%**	
Midterm 1	**15%**	
Midterm 2	**15%**	
Final Exam	**20%**	

The following scale will be used to assign your grade for this course:

D-	D	D+	C-	C	C+	B-	B	B+	A-	A	A+
60-62	63-66	67-69	70-72	73-76	77-79	80-82	83-86	87-89	90-92	93-96	97-100

Grades will be rounded to the nearest whole number.

READING RESPONSES (10%)

You will write **25** reading responses over the course of the semester. You must submit reading responses by **10am** on the day of each class meeting (i.e., two hours before class starts). Reading responses are to be submitted on the class **discussion board** (on Piazza). For each class meeting, I will create a topic on the discussion board for the assigned reading. You must respond to that topic by writing **three of your own questions** based on the reading. These questions should be intended to *provoke discussion* (as opposed to being merely clarificatory). They should also attempt to synthesize information.

There are 37 total reading assignments for the course, but only 25 required reading responses. This is because I understand that you all lead busy and complicated lives. In order to provide you with flexibility in both your schedule and your chosen topics, you may choose *which* 25 reading assignments you want to submit questions for. Each submitted response is worth up to 0.4% of your course grade (for a total of up to 10%) and will be graded on the quality of your response.

The goal for these reading responses is to help you think critically about the reading, assess your own understanding of the material, prepare for in-class discussions, and study for quizzes and the final exam.

WEEKLY QUIZZES (10%)

At the beginning of each Monday class meeting, starting the second week (see calendar below), there will be a **5-minute, closed-book quiz**. Quizzes will consist of a mixture of multiple-choice, fill-in-the-blank, and short-answer questions. The lowest 2 quiz grades for each student will be dropped, so only your top 10 quiz grades count (up to 1% each).

The goals of giving weekly, low-stakes quizzes are to provide you with retrieval practice throughout the quarter and to encourage you to review and synthesize the material— which facilitates longer-term retention of the material. It will also help me monitor how well the class is learning, and whether there are tough concepts we need to revisit.

MIDTERMS AND FINAL EXAM (15%, 15%, and 20%)

The exams will consist of a mixture of *multiple-choice, short answer, and essay questions*. You are responsible for everything covered in the **required readings** and in the **lectures**. If material appears in *both* the readings *and* the lectures, then it is even more likely to appear on the exams. I am not interested in your ability to memorize; I want you to think critically about theories, viewpoints, and experimental design. Thus, the exam will focus on *concepts* and their *applications*, not names or dates. All exams will be *cumulative*, with greater emphasis on content covered since the previous exam.

The goal of the exams is to assess your learning of the material, and to encourage you to review older topics (interleaving) as we progress. The exam is also a learning event in itself. Studies show that retrieval practice while studying and taking exams leads to longer-term learning.

PAPER CRITIQUE (30%)

Much of cognitive science research is carried out through experiments. As such, part of learning to think like a cognitive scientist requires learning to think about experimental design and the validity of inferences from results. Yet it's also true that many of you may not become cognitive scientists but will continue to follow cognitive science research in the news. In order to practice experimental thinking and become a more informed consumer of science in the media, your writing assignment is to choose an article in the news media (the article choices, along with a *more detailed paper rubric* will be added to Moodle on a later date) that reports on a recent experiment on a cognitive science topic. Your assignment is to **write a critique of *both* the news article and the scientific journal article** on which it is based. Late papers will be penalized by 10 percentage points (a letter grade) per day late.

The goal of this term paper is to help you to practice critical thinking about both individual experiments and their popular news coverage. Additionally, it is an opportunity for you to practice your formal writing and ability to synthesize and critique ideas.

ACADEMIC INTEGRITY

The policies of Macalester College on academic integrity are described online at https://www.macalester.edu/academicprograms/academicpolicies/academicintegrity/. Additionally, the Library has resources at https://libguides.macalester.edu/?b=t under the "General Purpose" section to help you maintain academic integrity under pressure. If you have any concerns about maintaining your academic integrity, please contact me *prior* to submitting an assignment. If I have reason to suspect that a student's academic integrity, I will set up a meeting to discuss the issue, and then will decide which steps are most appropriate to take, including a failing grade on the assignment or a report to the Director of Academic Programs and Advising.

ACCOMMODATIONS FOR DISABILITIES

I am committed to supporting the learning of all students in my class. If you are encountering barriers to your learning that I can mitigate, please bring them to my attention. If you need disability-related accommodations, please contact the Disability Services office by emailing disabilityservices@macalester.edu, or by calling 651-696-6874 to schedule an appointment to discuss your individual needs.

YOUR HEALTH, WELLNESS, AND LEARNING

It is my goal for the semester to help guide your learning as much as possible, but there are also many great resources at Macalester that you should be sure to utilize, especially the Health and Wellness Center (https://www.macalester.edu/healthandwellness/) and MAX Center (https://www.macalester.edu/max/), along with writing tutors at the MAX and specialized tutoring for multilingual students through the MAX Pairs program. Please also see the "Write Well" video series at https://www.macalester.edu/academics/writewell/.

TENTATIVE COURSE SCHEDULE (Readings & updates will be posted online)

WEEK	Monday	Wednesday	Friday
1 *Introduction*		9/5 *Introduction*	9/7 Learning Strategies (Putnam et al.)
2 *From Behavior to Cognition*	9/10 *Quiz 1* Behaviorism (Watson)	9/12 Latent Learning (Tolman)	9/14 The Cognitive "Revolution" (Miller)
3 *Sensation & Perception*	9/17 *Quiz 2* Perception I (Hoffman)	9/19 Perception II	9/21 Levels of Analysis (Marr)
4 *Attention & Memory*	9/24 *Quiz 3* Attention (Treisman)	9/26 Learning & Memory (Bjork & Bjork)	9/28 Memory Errors (Loftus & Palmer)
5 *Concepts*	10/1 *Quiz 4* Concepts (Rosch & Mervis)	10/3 Concepts & Language (Hespos & Spelke)	10/5 Modularity of Mind (Fodor)
6 *Big Picture*	10/8 *Quiz 5* Perception to Action (Bermúdez)	10/10 Models (Braitenberg)	10/12 **Midterm 1**
7 *Minds, Brains, & Computers*	10/15 Mind & Body (Descartes)	10/17 Mind & Computer (Lovelace, Turing)	10/19 Mind & Brain (Piccinini)
8 *Thinking Machines*	10/22 *Quiz 6* The Turing Test (Turing)	10/24 Semantic Content (Searle)	10/26 <u>NO CLASS</u>
9 *Representation: Connections & Symbols*	10/29 *Quiz 7* Connectionism (Feldman & Ballard)	10/31 Connections vs. Symbols (Fodor & Pylyshyn)	11/2 Symbol Grounding (Harnad)
10 *Modeling*	11/5 *Quiz 8* Cognitive Architecture (Anderson et al.)	11/7 Bayesian Models (Tenenbaum et al.)	11/9 TBD
11 *Mental Models*	11/12 *Quiz 9* Conceptual Metaphors (Lakoff & Johnson)	11/14 Mental Models (Johnson-Laird)	11/16 **Midterm 2** *(Prof. Bye absent)*
12 *Cognitive Development*	11/19 Infant Vision (Johnson)	11/21 <u>NO CLASS</u>	11/23 <u>NO CLASS</u>
13 *Language & Development*	11/26 *Quiz 10* Word Learning (Landau et al.)	11/28 Causal Learning (Gopnik)	11/30 Nature & Nurture (Spencer et al.)
14 *Thinking & Reasoning*	12/3 *Quiz 11* Induction & Deduction (Cheng & Holyoak)	12/5 Analogical Reasoning (Gentner)	12/7 Schemas (Chi et al.)
15 *Consciousness*	12/10 *Quiz 12* Qualia (Nagel)	12/12 New Frontiers	

Final Exam: Monday, 12/17, 8am-10am, OLRI 352