University of Waterloo

Waterloo ON
Phil/Psych 256 (Section 001), Introduction to Cognitive Science
Winter 2019, TTh, 1:00-2:20p, PHY 313

INSTRUCTOR INFORMATION

Dr. Nicholas Ray (nmray@uwaterloo.ca)
Office: Hagey Hall, 322
Hours: Tuesdays and Thursdays, 11:00a to 12:30p (or by appointment)

COURSE DESCRIPTION

This course will be a philosophical introduction to some of the main themes and interdisciplinary questions at the heart of cognitive science. As a relatively new scientific discipline (in comparison with, say, physics or chemistry), many of the foundational issues are still to be settled. This has led to lively debate and congress between people from different (and sometimes competing) schools of thought, coming from a wide array of backgrounds, including philosophy, psychology, linguistics, anthropology, computing and AI research, mathematics, and neuroscience (to name but a few). While cognitive science gets its proper start after the Second World War, we will see how the roots of cognitive science go back much deeper in the Western intellectual tradition. One should not be surprised about this much longer history, given that cognitive science asks a range of very specific questions about cognition, but also more general questions, including the following:

- What is intelligence? How is it studied?
- Is it possible to design intelligent machines? Have we already designed them?
- Is the brain a computer? If so, what kind of computer? What is computation?
- Do we think by using discrete rules? What is the content of thought—is it quasi-linguistic, conceptual, imagistic, analogical?
- What are concepts, and how do they get their meanings?
- What differences and similarities are there between cognition in humans and non-human animals?
- Is some cognition inherently social?
- Does cognition happen in the head, or is it embodied, enactive, and extended? Is some cognition social?
- What is the role of emotion in cognition?

We will discuss different things minds can do, with a primary focus on computation and mental representation. The first two weeks of the course will cover the philosophical and psychological prehistory of cognitive science, and then we will start looking at views of the mind that have been developed since the 1950s—the beginning of the so-called "Cognitive Revolution".

INTENDED LEARNING OUTCOMES

The hope is that everyone learns new ways of thinking about how the mind works and comes to gain a respect for the interdisciplinary study of the mind. However, we also hope to achieve some more specific learning outcomes, not all of which are tied to course content, including critical reading and writing skills, the development of peer evaluation skills, and debate/discussion skills. By the end of this class, students should be able to:

1. **Conceptualize** the different theories of cognition and mental content we will encounter, including the Computational-Representational Theory of Mind.
2. **Critically assess** the different arguments made for different theories of mind (mental function and mental content).
3. **Discern** normative/evaluative questions about how we ought to think from descriptive or factual questions about how we actually do think.
4. **Hone your writing and research skills**.
5. Be able to **identify, name, analyse/define, and apply key terminology** from the various disciplines we will encounter.
6. **Speak meaningfully** about the promises and pitfalls of interdisciplinary research.

WHAT YOU MUST DO TO SUCCEED

- **Attend classes** and **do the readings.** Nick will be posting lecture material (when it is possible to post it), but there aren't always lecture slides, and they do not contain all of the necessary content, nor a record of our class discussions. Missing lecture will make it hard to do well on the assessments in this course.
- **Be critical but fair** when dealing with ideas that are coming from a different perspective than your own. If you're a computer scientist, you might not initially get why the philosophers and psychologists are talking so much about consciousness; if you're a biology student, you might not understand why the computer scientists talk about thought as rule-governed inference; philosophers and psychologists might not mean exactly the same thing by "concepts"! Be open to meeting each other using overlapping vocabularies and shared ideas.
- Be willing to **clarify** your views using course concepts and terminology.
- **Engage in criticism and debate**. Treat your interlocutor with respect and apply the principle of charity. We want to be humble in the process of knowledge production. We are all fallible, and we are all part of a community of inquirers that can help limit the deleterious effects of bias and unclear thinking.
- **Expect** the professor to (a) hold regular office hours, (b) respond to e-mails in a timely manner (usually within 24 hours), and (c) offer you substantive feedback that explains your grade and helps you improve on future assignments.

COURSE MATERIALS

Primary texts will be made available as PDFs or as links to online content on the course LEARN site. Nick will also be posting weekly notes regarding content that function more or less like chapters of a textbook. He will also post lecture slides when we use them.

SUPPLEMENTARY TEXTS
There is no textbook to purchase for this course. If students want to read something that nicely dovetails with the structure of this course, then they may be interested in either of these two textbooks (which are absolutely not necessary!):

Andy Clark, *Mindware: An Introduction to the Philosophy of Cognitive Science,* Second Edition. Oxford: Oxford University Press, 2014.

Paul Thagard, *Mind: Introduction to Cognitive Science*, Second Edition. Cambridge, Massachusetts: MIT Press (A Bradford Book), 2005.

ASSESSMENTS (Detailed Handouts and Guides to be Posted on LEARN)

Assessments	**Due Dates**	**Page Length**	**Value**
Online Quizzes	Jan. 23; Feb. 13; March 6; March 27	*NA*	5% x 4 = 20%
Critical Analysis	February 8	3-4 pages	20%
Proposal Draft and Peer Share	March 21	3 pages	5%
Proposal, Polished Draft	March 24	1-2 pages	10%
Term Project	April 14	6-8 pages	30%
Participation	*Ongoing*	*NA*	15%

Writing assignments are to be submitted to the relevant dropboxes on LEARN. Late submissions will be penalized **10% of the assessment value per day**, including part days, weekends, and holidays.

Online Quizzes: There will be 4 short assessments spaced throughout the term. Notice that the dates for these are all Wednesdays. You will have a limited amount of time to complete this assessment, likely 15 or 20 minutes (depending on the question format for each week), and the window during which you will attempt each quiz will be on a Wednesday evening from 5:00pm until the beginning of class on Thursday at 1:00pm. This window should work with everyone's schedules. We will then take up each quiz on the relevant Thursdays as a class.

Critical Analysis: You will reconstruct an argument or theoretical position from one of the course readings, tell your reader (a) what it means, (b) why you picked it, (c) why it is significant to Cognitive Science, and (d) what you think about the piece—going beyond mere opinion to craft a critical argument about the value of the content of your chosen passage. You should pick something specific to address, not the whole piece. Selections can range from a single turn of phrase to a whole paragraph or even section of an essay. Is the argument or theoretical position plausible? Do you think it is valid, apt, true, justified? Why or why not? How might somebody critique the author's views, and how might the author respond?

Term Project Proposal, Peer Share and Final Draft: You will propose your research to one another in groups of approximately 5 peers, and everyone will provide feedback on each short presentation. Nick will take pictures of the feedback, and each student will get grades based on the quality of their feedback for their peers (5%). Then you will use peer feedback to produce a polished formal proposal to be reviewed by the professor. This will be graded, comprising 10% of your final grade. You can bring whatever you want by way of early research for the peer share, but the formal proposal will have these elements: (a) a statement of your research question; (b) a sample introductory paragraph, including a clear statement of the relevant issue, some mention of the key pieces of literature that will help you structure your paper, and (c) your thesis statement. You will also provide an annotated bibliography of all relevant course material and at least two scholarly external sources. Feedback on the formal proposal, along with peer comments, will be invaluable for your work on the Term Project.

Term Project: This is a major essay that you will have been developing since approximately the mid-point of the term. You will utilise lessons learned on the Critical Analysis, the Peer Share, and Proposal to craft a paper that explores one of several questions to be provided to you well in advance of the due date. If students prefer to explore a question of their own devising or pursue a project that is not a traditional essay, then they should talk to Nick about their interests in advance—preferably before the Peer Share.

Participation: There will be lots of class discussion, and lots of structured activities—some individual in nature, and many based on group work. Students are expected to be at every lecture and are expected to engage in class discussion regularly. There will be some time every week (or nearly every week) devoted to structured or semi-structured discussion and activities. The bulk of the participation grade is devoted to these exercises. To get a good participation grade (a grade of 75% or above) you must attend and contribute frequently, and your contributions must be of the highest calibre—always respectful, based on course content, and focussed on advancing class discussion!

ELECTRONIC DEVICE POLICY

You may use a laptop or a tablet functioning as a note-taking device. Please don't get distracted by phones, unless we are using them for a class activity.

NOTE**:** There is a wealth of empirical evidence that shows use of screens in a class has a negative impact on you and those around you. If you need to use a laptop or other note-taking device, and you have no other accessibility issues that require you to be front and centre in the classroom, then please move to the back or sides of the room, where you will be less distracting to others.

LEARN (COURSE WEBSITE)

LEARN is the main mode of communication for this course after lecture and e-mail. Nick will be posting reading materials, lecture materials, announcements, any possible changes to the schedule, and grades via LEARN. You will also need to access LEARN for the quizzes. Because LEARN is so important, students are strongly encouraged to regularly access the site.

E-MAIL ETIQUETTE

1. Before sending an unnecessary e-mail make sure your question isn't easily answered by the syllabus or assignment handouts!
2. All e-mails should include "Phil/Psych 256" in the subject heading. Nick will try to reply later the day of sending, or by the end of the next business day—usually within 24 hours. If Nick hasn't responded within a day, feel free to send him a reminder e-mail.
3. Craft your e-mails in a professional manner. Offer a salutation, use your addressee's name, and sign off with your preferred name.
4. Think before sending any longer e-mails dealing with substantial content. Save your questions for class discussion or stop by office hours for extended chats.

TENTATIVE SCHEDULE

We will try to follow this schedule, but we will frequently go off on tangents, and explore whatever we find interesting as a class. It is your responsibility to come to class regularly to keep up with our current discussions.

January 8 and 10: Introduction and the Cognitive Revolution
G. Miller, "The Cognitive Revolution: a Historical Perspective"
Thagard, "Why Cognitive Science Needs Philosophy and Vice Versa"

January 15 and 17: Before the Revolution—Prehistory of Cognitive Science
Plato, (VIDEO, viewing in class): "Allegory of the Cave" from *Republic*
Plato, excerpt from *Phaedo*
Descartes, "Meditation VI" from *Meditations on First Philosophy*
Aristotle, excerpt from *De Anima*

January 22 and 24: From Turing Machines to Functionalism
Turing, "Computing Machinery and Intelligence"
Putnam, "The Nature of Mental States"
Searle, "Minds, Brains, and Programs"

January 29 and 31: Logic and the Frame Problem of AI
Frege, "Thought"
Dennett, "Cognitive Wheels: the Frame Problem of AI"

February 5 and 7: Language, Culture, and Innate Capabilities
Sapir, "The Status of Linguistics as a Science"
Chomsky, excerpts from *Syntactic Structures*
OPTIONAL: Everett, "Cultural Constraints on Grammar and Cognition in Pirahã"

February 12 and 14: Concepts, Part I—Classical Theories
Prinz, "Desiderata on a Theory of Concepts" from *Furnishing the Mind*
Fodor, "Unphilosophical Introduction: What Concepts Have to Be" from *Concepts*
Murphy, "Typicality and the Classical View of Concepts"

February 19 and 21: Reading Week
No classes; No new readings

February 26 and 28: Concepts Part 2—Resemblance Theories
Rosch, "Principles of Categorization"
Smith and Medin, "The Exemplar View"
Machery and Prinz* (VIDEO, viewing in class): "Theories of Concepts"
(Optional) Machery, Precís for *Doing Without Concepts*

March 5 and 7: Mental Imagery
Pylyshyn, "Mental Imagery: In Search of a Theory"
Kosslyn, Ganis, and Thompson, "Mental Imagery: Against the Nihilistic Hypothesis"

March 12 and 14: Neural Networks and Connectionism
Hinton, "How Neural Networks Learn from Experience"
Eliasmith, "How to Build a Brain"

March 19 and 21: Emotion and Cognition
Oatley and Jenkins, excerpt from *Understanding Emotions*
Damasio, "A Passion for Reasoning" from *Descartes' Error*

March 26 and 28: Extended Minds
Clark and Chalmers, "The Extended Mind"
Adams and Aizawa, "Why the Mind is Still in the Head"
(Optional) Thagard, "Bodies, the World, and Dynamical Systems"

April 2 and 4: Beyond Brains—Embodied Cognition and Social Cognition
Readings TBD

ACCOMODATION FOR STUDENTS WITH DISABILITIES
Note for students with disabilities: The AccessAbility Services office, located in Needles Hall Room 1401, collaborates with all academic departments to arrange appropriate accommodations for students with disabilities without compromising the academic integrity of the curriculum. If you require academic accommodations to lessen the impact of your disability, please register with the AS office at the beginning of each academic term.

SOURCES OF INFORMATION FOR STUDENTS
Academic integrity (Definition) Academic Integrity Office (uWaterloo)

ACADEMIC INTEGRITY
In order to maintain a culture of academic integrity, members of the University of Waterloo are expected to promote honesty, trust, fairness, respect and responsibility.

Discipline: A student is expected to know what constitutes academic integrity, to avoid committing academic offences, and to take responsibility for his/her actions. A student who is unsure whether an action constitutes an offence, or who needs help in learning how to avoid offences (e.g., plagiarism, cheating) or about "rules" for group work/collaboration should seek guidance from the course professor, academic advisor, or the Undergraduate Associate Dean. When misconduct has been found to have occurred, disciplinary penalties will be imposed under Policy 71 – Student Discipline. For information on categories of offenses and types of penalties, students should refer to Policy 71 - Student Discipline.

Grievance: A student who believes that a decision affecting some aspect of his/her university life has been unfair or unreasonable may have grounds for initiating a grievance. Read Policy 70 - Student Petitions and Grievances, Section 4.

Appeals: A student may appeal the finding and/or penalty in a decision made under Policy 70 - Student Petitions and Grievances (other than regarding a petition) or Policy 71 - Student Discipline if a ground for an appeal can be established. Read Policy 72 - Student Appeals.