

# University of Waterloo

## PHIL/PSYCH 256 (001)

### INTRODUCTION TO COGNITIVE SCIENCE

#### Fall 2022

#### INSTRUCTOR INFORMATION

**Dr. Nicholas Ray**

Email Address: [nmray@uwaterloo.ca](mailto:nmray@uwaterloo.ca)

Office Hours: Tuesdays and Thursdays, 1:00-2:00pm ET (or by appointment), HH 322

Or join via Zoom: <https://uwaterloo.zoom.us/j/96887277995?pwd=bUI5VEFPUXk3M3ZkV1JjNDdaSWgxZz09>

Class Meetings: Tuesdays and Thursdays, 2:30-3:50pm ET, EV3 1408

Or join via Zoom: <https://uwaterloo.zoom.us/j/95498838740?pwd=UzNoQTNTBT2dJSFdGaVpGL0ZnZ2xrUT09>

#### TA INFORMATION

**Mitchell Ross**

Email Address: [m2ross@uwaterloo.ca](mailto:m2ross@uwaterloo.ca)

Office Hours: Wednesdays, 1:00-2:00pm ET, HH 366

Or join via Zoom: <https://zoom.us/j/9796284562?pwd=RjhVRmNwdzhsN2dhNG8vNStiemNVQT09>

#### COURSE DESCRIPTION

This course will be a general 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 (in the form of new research projects) between people from different (and sometimes competing) schools of thought, coming from a wide array of backgrounds, including philosophy, psychology, linguistics, anthropology, computer engineering 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 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 machines that think? Have we already designed them using new techniques in machine learning?
- Is the organic brain just a computer? If so, what kind of computer? What is computation?
- When we think, do we use discrete rules?
- What is the *content* of thought—is it quasi-linguistic, conceptual, imagistic, analogical?
- What are concepts? What role do they play in cognition? How do they get their meanings?
- What differences/similarities are there between cognition in humans and non-human animals?
- What is the role of emotion in cognition?
- Does cognition happen entirely in the head, or is it embodied and extended?
- Is some cognition inherently social?

We will discuss different things minds can do, with a primary focus on the nature of 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”. We will see how these debates enliven and enrich current research of minds and mental processes.

### INTENDED LEARNING OUTCOMES RE: COURSE CONTENT

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 directly tied to specific 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. **Assess critically** 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. Be able to **identify, analyse/define, and apply key terminology** from the various disciplines we will encounter.
5. **Evaluate critically** the promises and pitfalls of interdisciplinary research. (Not everything works nicely when different folks get together across disciplinary divides!)
6. **Engage critically** with your peers to help produce the best possible research in a community of inquirers.

### ACHIEVING THE LEARNING OUTCOMES

- **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 enlightening class discussions. Missing lecture will make it hard to do well on the assessments in this course, especially the quizzes (which are based mostly on lecture content and discussions).
- **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 cognition 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.
- **Interact** with peers, the professor, and the TA to help you with the material and assessments.

## TYPICAL WEEKLY STRUCTURE

### **Mondays:**

- Nick will post lecture content and updates about what we will be doing for the week ahead.
- This is a great time to look over the readings for the week.

### **Tuesdays:**

- We will meet for lecture and class discussion, including activities and workshops.
- If there was a quiz the previous week, we will take it up as a class before starting on new content.
- Nick holds office hours. Stop by his office or drop in via Zoom (see above for link).

### **Wednesdays:**

- There are no scheduled class activities, but get caught up on reading or use this time to work on your writing assignments.
- Mitchell holds office hours. Stop by his office or drop in via Zoom (see above for link).

### **Thursday:**

- We will meet for lecture and class discussion, including activities and workshops.
- Nick holds office hours. Stop by his office or drop in via Zoom (see above for link).
- If it is a quiz week, Nick will open the quiz sometime after class has ended. (The quiz will always be published after class on Thursday, and remain open until end of the day on Sunday.)

### **Fridays:**

- If it is a quiz week, make sure to do the quiz as soon as possible. You have until Sunday, but there is no reason to take time out of your weekend. Make Friday really count!

## COURSE MATERIALS

The readings and occasional viewings are the foundation for our in-class work and your writing projects this term. You are therefore responsible for completing at least some of the readings for each week. THERE IS NO EXPECTATION THAT YOU WILL COMPLETE EVERY READING FOR EVERY WEEK. Just do at least a little bit of reading to help prepare for class discussions. When you find a topic you want to explore more deeply for the Term Paper, you can go back and read more from the relevant units as needed. Video clips that are shown in class are also considered course “texts”, and it is expected that you bring them into your written work as resources wherever they may be relevant.

There is no textbook for this course. Course material will be made available on LEARN as PDFs or as links to external content. I am making my course notes available as we proceed, and they function as something like an optional textbook for easy reference, and to make sure you are meeting the learning outcomes for the course. They also include study questions and key terms for each unit of the course.

## ASSESSMENTS OVERVIEW

ASSESSMENT NAME	DUE DATE(S)	VALUE
Bi-Weekly Quizzes	Sept. 18; Oct. 2; Oct. 23; Nov. 6; Nov. 20; Dec. 4	5 x 5% = 25% (Lowest of 6 grades is dropped.)
Critical Analysis	October 7	20%
Term Paper Proposal and Peers Share	Nov. 22 and 27	5% + 5% = 10%
Term Paper	December 15	30%
Attendance and Participation	Ongoing	15%

## DESCRIPTION OF ASSESSMENTS

### Bi-Weekly Quizzes

Every other week, students will be asked between one and six questions, totalling 5% of their overall grade. If only one question is asked, it will be VERY challenging, since it is worth 5% of your overall grade. (This would be very unlikely, but it is possible.) Usually, quizzes will include multiple choice or best answer questions (usually worth 1% each), and true/false questions (usually worth 0.5%). The usual quiz will be four multiple choice questions and two true/false questions, or three multiple choice questions and 4 true/false questions. These quizzes will be difficult to do well on unless you regularly come to class. They are based primarily on lecture. Where you need to have done a specific course reading, this will be made clear to you in advance.

Quizzes will open every other Thursday (sometime after class ends) and remain open until 11:59pm ET on the following Sunday. This means you have over three days to complete the quiz. The quiz will cover content addressed up to, and including, the end of Thursday's meeting. For the term, you will have 6 quizzes, but only your best 5 grades will be counted. This means you can skip one quiz or complete all 6 and keep your 5 best grades. Quizzes will take place online, via LEARN's quiz tool.

### Critical Analysis

This is a short assignment of ~3 double-spaced pages. A bibliography is not required unless you use external resources. You will reconstruct an argument or theoretical analysis 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. Is the argument or theoretical position plausible? Do you think it is valid, apt, true, justified? Why or why not? Is the author discussing a concept? If so, is the discussion clarificatory or opaque? How might somebody critique the author's views, and how might the author respond?

### Term Paper Proposal and Peer Share

You will propose your research to one another in groups of 3 or 4; everyone will provide feedback on each short proposal. Students 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 Nick and Mitchell (also worth 5%). 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 (tentative) thesis statement. You will also provide a bibliography of all relevant course material *and at least two scholarly external sources*. You can use some non-scholarly resources too, but we need to see at least two external scholarly sources.

## Term Paper

This is a major project in which you will bring together disparate elements of the course, offering careful exposition and novel argument of your own. Utilising comments from the Peer Share and Proposal process, you will craft a paper that explores major course themes and uses the interdisciplinary methods we will have been developing since the beginning of term. The paper has to be more than a research paper or literary survey. You must take up a substantive and contentious thesis related to course material, and argue for your position (while also arguing *against* other plausible positions).

## Attendance and Participation

There will be lots of class discussion, and lots of activities—some individual in nature, and many based on group tasks. 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 (though this does not mean you must speak at every meeting), and your contributions must be of the highest calibre—always respectful, based on course content, and focussed on advancing class discussion! As the title of this assessment makes clear, mere attendance is not enough for a good grade.

## COURSE SCHEDULE (TENTATIVE)

DATES	Topic(s)	Readings/Viewings
Sept. 8	Welcome to Cognitive Science!	- READ THE SYLLABUS!!! - G. Miller, "The Cognitive Revolution: a Historical Perspective" - Thagard, "Why Cognitive Science Needs Philosophy and Vice Versa"
Sept. 13 and 15	Pre-History of Cognitive Science	- Plato, <i>Phaedo</i> (74-77) - Descartes, excerpt from the <i>Meditations</i> (Wax Argument) - OPTIONAL: Aristotle, excerpt from <i>De Anima</i>
Sept. 20 and 22	Turing Machines and Functionalism	- Turing, "Computing Machinery and Intelligence" - Searle, "Minds, Brains, and Programs" - OPTIONAL: Putnam, "The Nature of Mental States"
Sept. 27 and 29	Logic, Cognition, and the Frame Problem	- Frege, "The Thought: A Logical Inquiry" - Dennett, "Cognitive Wheels" - OPTIONAL: McCarthy and Hayes, "Some Philosophical Problems from the Standpoint of AI"
Oct. 4 and 6	Cognition and Linguistic Ability	- Sapir, "The Status of Linguistics as a Science" - Chomsky, "On the Nature, Use, and Acquisition of Language" - OPTIONAL: Everett, "Cultural Constraints on Grammar and Cognition in Pirahã"

October 8-16: Have a nice **Thanksgiving Weekend** and **Fall Reading Week!**

Oct. 18 and 20	Concepts Part 1: Classical and Atomistic Theories	<ul style="list-style-type: none"> <li>- Prinz, "Desiderata on a Theory of Concepts" from <i>Furnishing the Mind</i></li> <li>- Fodor, "Unphilosophical Introduction: What Concepts Have to Be" from <i>Concepts</i></li> <li>- Murphy, "Typicality and the Classical View of Concepts"</li> </ul>
Oct. 25 and 27	Concepts Part 2: Resemblance Theories	<ul style="list-style-type: none"> <li>- Rosch, "Principles of Categorization"</li> <li>- Smith and Medin, "The Exemplar View"</li> <li>- Machery and Prinz* (VIDEO, viewing in class): "Theories of Concepts"</li> <li>- OPTIONAL: Machery, <i>Precis for Doing Without Concepts</i></li> <li>- OPTIONAL: Fodor, "Concepts: A Potboiler"</li> </ul>
Nov. 1 and 3	Mental Imagery	<ul style="list-style-type: none"> <li>- Pylyshyn, "Mental Imagery: In Search of a Theory"</li> <li>- Kosslyn, Ganis, and Thompson, "Mental Imagery: Against the Nihilistic Hypothesis"</li> </ul>
Nov. 8 and 10	Connectionism and (Artificial) Neural Networks	<ul style="list-style-type: none"> <li>- Hinton, "How Neural Networks Learn from Experience"</li> <li>- Eliasmith, "How to Build a Brain"</li> </ul>
Nov. 15 and 17	Emotion and Cognition	<ul style="list-style-type: none"> <li>- Oatley et al, "<i>Cognition and Emotion</i> Over 25 Years"</li> <li>- Damasio, "A Passion for Reasoning" from <i>Descartes' Error</i></li> <li>- Prinz, "Is Emotion a Form of Perception?"</li> </ul>
Nov. 22 and 24	Extended Minds	<ul style="list-style-type: none"> <li>- Clark and Chalmers, "The Extended Mind"</li> <li>- Adams and Aizawa, "Why the Mind is Still in the Head"</li> </ul>
Nov. 29 and Dec 1	Embodied and Situated Cognition	<ul style="list-style-type: none"> <li>- Jacobson, "Seeing as a Social Phenomenon"</li> <li>- de Bruin and Kästner, "Dynamic Embodied Cognition"</li> </ul>
Dec. 6	Wrap Up and Concluding Discussions	- No New Readings

## COURSE POLICIES

### Turnitin (Plagiarism Detection and Beyond)

Text matching software (Turnitin®) will be used to screen assignments in this course. This is being done to verify that use of all material and sources in assignments is documented, but also to help you learn how to properly cite the work of others, how not to use too much quoted material in your papers, and how to strike that right balance between careful exegetical work and novel contributions in your writing. Students are here given the option if they do not want to have their assignment screened by Turnitin®. In the first week of the term, please speak to Nick if you do not want your assignments to be processed through Turnitin® in this course. We will be able to find an alternative.

### Late Work Policy and Missed Quiz Policy

There are no late penalties for written work in this class. Writing assignments not submitted by the listed due dates may not receive full comments and may not be returned in time so that comments will be useful for the next assignment that is due. Please try to submit your work on time; if you are having trouble, please try to speak to Nick *before* missing the stated deadlines.

Missed quizzes will not be rescheduled, except in extremely rare and serious circumstances (personal health crises, family emergencies, etc.). You already have more than three days to complete each quiz, and you can miss one whole quiz without it necessarily affecting your grade. This assessment has built into it every leniency Nick is willing to grant.

*The absolute last day to submit the Critical Analysis and Term Paper Proposal is **11:59pm ET, Dec. 8**. After this date, work will not be accepted (unless you have already made an arrangement with Nick). The absolute last day to submit the Term Paper is **11:59pm ET, Dec. 21**.*

### Grade Appeal Policy

If you are concerned that an assignment was not graded fairly, take some time and reflect upon the comments Nick and Mitchell have provided. If they don't make sense, come and talk to whoever graded your work. If they make sense, but you disagree with the comments, or think they are insufficient grounds for your grade, then talk to whoever graded your work. We'll figure it out.

### Electronic Device Policy

The pandemic may affect our mode of teaching and learning. We may go back to online at any moment. When engaged with one another on Zoom or any other virtual platforms, we will be using electronic devices. Here are some rules and guidelines to follow when engaging in the course:

1. It is important that you try to give your interlocutors the attention they deserve. Please don't be distracted by non-course content.
2. Do not take pictures, screen grabs, or make recordings of any class meetings. Just as you are not allowed to walk into a classroom and take pictures of the content the professor has up on the screen or blackboards, and just as you are not allowed to take pictures of your fellow students in that classroom, treat the online meeting spaces with the same reverence and respect.
3. Only Nick will record group meetings, and only for the purposes of sharing them asynchronously with students in the class on LEARN.
4. You and your peers should expect a safe space in which to learn. We will respect the right to privacy of all members in classroom spaces (physical and virtual), and we will respect intellectual property by not disseminating the work of others (including Nick's intellectual property... so don't post his lecture slides or course notes on Course Hero or similar sites).
5. If you are accessing meetings via Zoom, you are never required to have your camera turned on. If you do have your camera on, please make sure you are aware that you are letting others into your personal space. Make wise decisions about what you make visible to others.
6. All e-mails should include "PHIL/PSYCH 256" or "Intro to Cog Sci" in the subject heading. This will ensure they don't get lost. Nick and Mitchell will try to get back to you as quickly as possible (usually within 24 hours), but please leave **48 hours** for reply. If Nick or Mitchell have not responded in 48 hours, then something has gone wrong. Feel free to send them another e-mail as a kick in the pants!
7. Think before sending any longer e-mails dealing with substantial content. Longer questions are often also better dealt with in class meetings or during office hours.

## Continuity of Learning Policy

Covid has already interfered with past terms and may further interfere with our plans to be back on campus for the entirety of the Fall term, 2022. We can't foresee every possible scenario, but here what we will try to do if our plans have to shift:

1. If we must move to remote teaching and learning, we will follow the same schedule and continue to meet via Zoom and continue to make good use of LEARN.
2. If you fall ill, with Covid-19 or any other ailment that keeps you from attending in-person or remote sessions, please speak with Nick as soon as possible. We will be recording all of our meetings via Zoom, even if they take place on campus in the classroom. These recordings will be accessible to you, and, if you are feeling well enough, you can join the livestream as well.
3. If Nick falls ill, with Covid-19 or any other ailment that keeps him from teaching, a solution will be found depending on the nature of the illness. If Nick is still feeling well enough to teach, but cannot be on campus, then we will meet via Zoom. If Nick is so unwell that he cannot teach at all, then lecture content will still be posted, and the course may be taught by another faculty member or graduate student.
4. If Nick or Mitchell fall ill, with Covid-19 or any other ailment that keeps them from grading, another faculty member or graduate student may have to take up the grading load, and there may be some delay in when you receive feedback/grades.

## MENTAL HEALTH SUPPORT

All of us need a support system. The Faculty of Arts encourages students to seek out mental health supports if they are needed.

### On Campus

- Counselling Services: [counselling.services@uwaterloo.ca](mailto:counselling.services@uwaterloo.ca) / 519-888-4567 ext 32655
- MATES: one-to-one peer support program offered by Federation of Students (FEDS) and Counselling Services
- Health Services Emergency service: located across the creek from Student Life Centre

### Off campus, 24/7

- Good2Talk: Free confidential help line for post-secondary students. Phone: 1-866-925-5454
- Grand River Hospital: Emergency care for mental health crisis. Phone: 519-749-433 ext. 6880
- Here 24/7: Mental Health and Crisis Service Team. Phone: 1-844-437-3247
- OK2BME: set of support services for lesbian, gay, bisexual, transgender or questioning teens in Waterloo. Phone: 519-884-0000 extension 213

Full details can be found online at the Faculty of ARTS website

Download UWaterloo and regional mental health resources (PDF)

Download the WatSafe app to your phone to quickly access mental health support information

## UNIVERSITY REGULATIONS

### Academic Integrity

*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. See the UWaterloo Academic Integrity webpage and the Arts Academic Integrity webpage for more information.



**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. For typical penalties check Guidelines for the Assessment of Penalties.

**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. When in doubt, please be certain to contact the department’s administrative assistant who will provide further assistance.

**Appeals:** A decision made or penalty imposed under Policy 70 - Student Petitions and Grievances (other than a petition) or Policy 71 - Student Discipline may be appealed if there is a ground. A student who believes he/she has a ground for an appeal should refer to Policy 72 - Student Appeals.

#### **Accommodation for Students with Disabilities**

Note for students with disabilities: The AccessAbility Services office, located on the first floor of the Needles Hall extension (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.