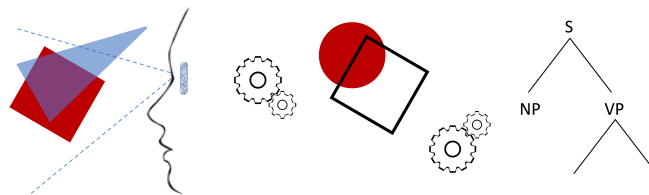


# Minds, Brains, and Machines

COGS/PHIL 2160

Winter 2020 / York University

Course Website: <https://moodle.yorku.ca/moodle/course/view.php?id=158785>



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**Course Description** We have minds—with which we perceive, think, and use language. How do perceiving, thinking, and language work? More generally: How do minds work? How do you perceive the three-dimensional shape of a mug when all the eye gets is a two-dimensional array of light? How can you think about hypotheticals, such as what you would do if 30-50 feral hogs were to enter your yard? How can you understand lyrics and sentences that are like nothing you've heard before? Mental capacities like these are some of the most impressive and puzzling products of nature. The cognitive sciences—including philosophy, psychology, neuroscience, linguistics, anthropology, evolutionary biology, and artificial intelligence—use scientific experimentation and theory to explain how these mental capacities work. We will look at recent and historical attempts to explain core aspects of our mental lives and those of other animals. In doing so, we will examine the foundational concepts and principles that make scientific explanations of the mind possible. At the same time, we will consider the possibility of building machines with mental lives of their own. [Syllabus is subject to change.]

**Goals**

- Identify and understand the core concepts, principles, and experimental methods employed in cognitive science.
- Understand and evaluate major historical developments in cognitive science, recent discoveries and trends, and how contemporary research fits into a broader historical context.
- Learn how to comprehend, critically evaluate, and write about cognitive scientific research—appraising methodology, empirical evidence, and argumentation.

Meetings				
<i>Attendance in both lectures and sections is mandatory.</i>				
<b>Lectures:</b>	M, W	10:30am	@	VC 135
<b>Sections:</b>				
J. CUMBY	M	9:30am	@	HNE 104
		11:30am	@	DB 0004
	W	9:30am	@	VC 102
		11:30am	@	MC 213
B. TINKLENBERG	M	9:30am	@	RS128
	W	9:30am	@	RS133

Assignments	Date	Grade %
Papers (do 2 of 3)	1/24, 2/14, 3/20	30%
Midterm Exam	3/2	30%
Final Exam	TBD (exam period)	35%
Section Participation	weekly	5%

**Special Accommodations** The instructors are committed to fairly accommodating students with disabilities. Please contact the instructors and Student Accessibility Services (<https://accessibility.students.yorku.ca>) as soon as possible, and we will all work together to find a fair accommodation.

**Readings**

*Please read the designated materials before the lecture for which they have been assigned (≈ 20-35 pages per lecture).*

**Textbook:** José Luis Bermúdez, *Cognitive Science: An Introduction to the Science of the Mind*, 3rd Ed. (2019). ISBN: 9781108440349.

**Other Readings:** All other readings will be made available on the course website: <https://moodle.yorku.ca/moodle/course/view.php?id=158785>.

**Papers:** The paper assignments will train you to read about a study, critically evaluate it, and communicate your understanding of it.

- You must complete two out of three paper assignments. If you complete all three, we'll count your two highest grades.
- Assignments will be posted on the course website and should be submitted to Turnitin through the course website.
- Late papers are not accepted.

**Exams:**

- The midterm exam will be multiple-choice.
- The final exam will be a combination of multiple-choice and short-answer, and will cover material from the entire course.
- You must be present for both exams to pass the course. Alternative arrangements can only be made in extraordinary circumstances, must be arranged ahead of the exam unless extraordinary circumstances prevent it, and must be well documented.
- Exams will be in-class and closed-book.

**Section Participation:** Beyond showing up, you will benefit from actively participating in your discussion sections.

**Academic Integrity** Academic dishonesty, including plagiarism, will be taken extremely seriously. Potential penalties include, but are not limited to, failure of the assignment and/or failure of the course. Students are expected to be familiar with York's policy regarding academic integrity: <http://www.yorku.ca/secretariat/policies/>.

## Tentative Schedule

<i>Concepts</i>			
1	M 1/6	Sciences of the mind	No reading
	W 1/8	From behavior to mental states	Bermúdez, <i>Cognitive Science</i> (2019) [henceforth “JLB”]: pages 12–22
2	M 1/13	Rules: Constructing language	JLB: 22-28; Yang, <i>The Infinite Gift</i> (2006): Ch. 2
	W 1/15	Representations: Reconstructing the world	Land and McCann, “Lightness and Retinex Theory” (1971); Maloney, “Surface Color Perception and Environmental Constraints” (2003): 281-4
3	M 1/20	Processes: Information, form, and transformation	JLB: 28-34, 47-53
	W 1/22	Levels of explanation <b>First Paper Due 5pm 1/24</b>	JLB: 53-65
4	M 1/27	Neural structures	JLB: 65-76, 80-95
	W 1/29	Neural functioning	JLB: 229-256; Wurtz, “Recounting the Impact of Hubel and Wiesel” (2009)
<i>Frameworks</i>			
5	M 2/3	Computation	Crane, <i>The Mechanical Mind</i> (2003): 83-104
	W 2/5	Physical symbol systems	JLB: 96-123
6	M 2/10	Connectionism	JLB: 123-149
	W 2/12	Probabilistic inference <b>Second Paper Due 5pm 2/14</b>	JLB: 171–186; Domingos, <i>The Master Algorithm</i> (2015): Ch. 6
	M 2/17	<i>Reading week: no class</i>	
	W 2/19		
7	M 2/24	Bayesian mind	Griffiths et al., “Bayesian Inference” (2012)
	W 2/26	Modularity	JLB: 203-229
8	M 3/2	<b>MIDTERM</b>	
<i>Intersections</i>			
8	W 3/4	Causal inference in humans and other animals	Blaisdell et al., “Causal Reasoning in Rats” (2006); Waldmann et al., “Beyond the Information Given: Causal Models in Learning and Reasoning” (2006)
9	M 3/9	The development of causal inference	Carey, <i>The Origin of Concepts</i> (2009): Ch. 6; JLB: 286-293
	W 3/11	Causal theories, essentialism, and bias	Leslie, “Carving Up the Social World with Generics” (2014)
10	M 3/16	Causal attribution and moral judgments	Alicke et al., “Causal Conceptions in Social Explanation and Moral Evaluation: A Historical Tour” (2015)
	W 3/18	Computational theory of causal inference <b>Third Paper Due 5pm 3/20</b>	Khemlani et al., “Causal Reasoning With Mental Models” (2014)
11	M 3/23	AI: Machine learning	JLB: 307-333; Lewis-Kraus, “The Great A.I. Awakening” (2016)
	W 3/25	AI: Machines, models, and society	O’Neil, <i>Weapons of Math Destruction</i> (2016): Ch. 1; Pearl, <i>The Book of Why</i> (2018): Ch. 1
12	M 3/30	TBD (To Be Determined)	
	W 4/1	TBD	
	TBD	<b>FINAL EXAM</b>	