PSYC*3280   Course Outline: Fall 2018

General Information

Course Title: Minds, Brains, Machines

Course Description:

We seem to have minds and to know certain things about mental processes and events (for example, that we can remember past experiences). We know that we have a brain and we (most of us) believe that strong versions of dualism (substance dualisms) are false and that there is a link between what goes on mentally and what goes on in the brain. This is the classic mind-brain problem in philosophy: what's the nature of the link? We also know that computers, which are (mostly) physical symbol systems capable of highly complex, thought-like computation point the way toward an understanding of how thought in a physical system could be possible. This is good news, in the sense that we seem to be such systems (thinking; physical). So there is an attractive hypothesis on offer: Our mind is like a program implemented by our brain which is in fact a computational device. Mind, brain, machine, all in one. It is the various flavors of this core idea, and with the related idea of AI (artificial Intelligence) that we will be occupied with in this course.

Credit Weight: 0.5

Academic Department: Psychology

Semester Offering: F18

Class Schedule and Location: MWF 4:30-5:20 in THRN 1307

Instructor Information

Instructor Name: Don Dedrick
Instructor Email: ddedrick@uoguelph.ca
Office location and office hours: Mackinnon Rm. 329 Monday 11-12; Wednesday 11-12. By appointment (send an email request).

Specific Learning Outcomes:

1. Students will understand the basic assumptions and foundational ideas of contemporary cognitive science/AI, especially the idea that the mind is a computational device.
2. Students will be able to apply basic concepts of cognitive science/AI.
3. Student will be able to summarize some experimental and theoretical research that has contributed to the way cognitive science understands the mind.
4. Students will comprehend and articulate the different ideas about information processing that are used in cognitive science.
5. Students will be able to critically assess the strengths and weaknesses of different conceptions of AI and their relationship to the mind.
6. Students will develop analytical approaches to contemporary debates about AI.

Lecture Content:

Lectures in Part I are based on material you can access from the Courselink site for this course. Most weeks there will be a quiz at the end of Friday's class. The quiz functions as a grade component for the course, a way to check comprehension of the week's material, a method for the instructor to highlight important concepts and discussions, and as an opportunity to discuss material with classmates. Quizzes take different formats and are completed in groups. See below for more details.
Weeks in which there is a quiz are marked in this course outline with *

Week 1 Sept. 7
Friday only
Introduction to the class
Reading: no reading

Part I Foundational issues

*Week 2 Sept. 10-14
Thinking as computation. A history of the idea that thinking is a form of computation.
Reading 1 (Cummins)

*Week 3 Sept. 17-21: poverty of the stimulus and the (psychological) argument for a "stored program." Behaviourism failed as a general theory of cognition. One widely accepted reason for this failure, and one which is foundational to much cognitive science (including cognitive psychology and AI), is *the poverty of the stimulus argument*. This argument has the following conclusion: the stimuli available to a cognitive system underdetermines that system's behaviour. That being so, something other than stimuli pared with behaviours will be necessary to explain cognitive systems. This week we will look at three cases where the poverty of the stimulus argument has been invoked: maze following in rats (Reading 2 Tolman), infant cognition (Reading 3 Carey), human language (Reading 4 Chomsky)

*Week 4 Sept. 24-28:
The levels hypothesis. It is widely, perhaps universally, thought that *cognition needs to be understood at a number of different levels*. Some of these level differences are concerned with issues of scale--neurons vs. neural units vs. neural systems, for example, but others seem to imply more profound differences: our talk about the mind is often expressed without any reference to the brain. In a similar way, talk about a computer's program is often discussed independently of the machine that runs the program. What are the relevant levels and how are they related?
Reading 5 (Marr), Reading 6 (Carandini).

*Week 5 Oct. 1-5.
Information processing, representations, and cognitive architecture. We discuss two widely agreed upon claims: that *cognition is information processing and information processing involves representations.* We look at the two main types of architecture that are exploited in cognitive models--*physical symbol systems and connectionist networks*--as well as some of the disputes that have arisen concerning these architectures.
Reading 7 (Newell and Simon), Reading 8 (Stufflebeam), Reading 9 (Dedrick notes on connectionism)

Week 6 Oct. 8-12
Monday: Thanksgiving Holiday
Wed. and Friday: Continuation of Week 5 + discussion of midterm
Readings as above.

Week 7 Oct. 15-19
Monday Oct. 15: Midterm in class
Wed and Friday: Syntax and Semantics
Reading 10 (Dedrick)

*Week 8 Oct. 22-26
The Turing Test and AI. One of the problems with AI is that you are not allowed to smuggle too much intelligence into your models/machines. In solving this problem by making machine based AI really dumb-- Turing showed how to do this--we may create another problem: is it so dumb it doesn't/could never understand anything it's doing? The philosopher John Searle thinks so.
Reading 11 (Turing) and Reading 12 (Searle)

Part II The quest for Real AI

*Week 9 Oct. 29-Nov. 2
Different conceptions of AI and the big picture of cognitive science.
Reading: *Common Sense, the Turing Test, and the Quest for Real AI* Chapters 1 and 2.

*Week 10 Nov. 5-Nov. 9
Knowledge, intelligent behaviour, and Winograd schemas
Reading: *Common Sense, the Turing Test, and the Quest for Real AI* Chapters 3 and 4.

*Week 11 Nov. 12-16
Learning and Language
Reading: *Common Sense, the Turing Test, and the Quest for Real AI* Chapters 5, 6 and 7.

*Week 12 Nov. 19-23 Written assignment due in dropbox, Nov. 19 11:59 pm.
Symbol processing and knowledge based systems
Reading: *Common Sense, the Turing Test, and the Quest for Real AI* Chapters 8 and 9.

Week 13 Nov. 26-30 (Friday is a makeup class for Thanksgiving)
AI technology and the future.
Reading: *Common Sense, the Turing Test, and the Quest for Real AI* Chapter 10.

Course Assignments and Tests:

Assignment or Test	Due Date	Contribution to Final Mark (%)	Learning Outcomes Assessed
Quizzes	-In class, most Fridays (see * weeks above)	15%	1,2,3
Midterm	Oct. 15 -T/F and MC questions	25%	1,2,3,4,5
Written assignment	Nov. 19 -Rubric TBA -Hand in to dropbox by 11:59	30%	4,5,6
Exam	Dec. 4 -T/F, MC, and short answer	30%	1,2,3,4,5

Additional Notes on Quizzes and Written assignment

There will be 9 quizzes in total. The best 5 will count (5*3=15%). There are no makeup quizzes. Quizzes are done in groups and they will vary in nature. Students may submit individually, but try to work with a group if you can. Any student that enters the class after a quiz has started will earn a grade of zero on that quiz. Write the names, first and last, of all students in the group on the quiz.

The written assignment will be essay-like in nature, Details to be announced. Length: 2000-2500 words.

Final examination date and time:
11:30AM - 01:30PM (2018/12/03)
Room TBA
Final exam weighting: 30%

Course Resources

Required Texts:
Common Sense, the Turing Test, and the Quest for Real AI by Hector Levesque MIT Press (2017)
ISBN: 9780262535205
Online Texts available from Courselink.

Recommended Texts related material: see Courselink

There is a website for the course on Courselink, as usual. I will provide information about the course and copies of the PP slides used in class. These will be available before each class. All News about the course will be posted in the News section of the website. That is where I will post any changes or relevant information. All News will be sent to you by email, automatically.

Course Policies

Grading Policies

No late work is accepted without an acceptable reason. If work is accepted there is no penalty. If it is not accepted the grade is Zero. To be clear: there is no daily or weekly penalty. Either work is accepted or it is not. Please contact the instructor as soon as you become aware you will miss a due date, or if you are encountering a problem that might make it difficult for you to complete a requirement

Course Policy on Group Work:

The quizzes are done in groups. It is hoped you will contribute to a group discussion of the quizzes, but it is possible to write the quizzes on your own. Any student that enters the class after a quiz has started will earn a grade of zero on that quiz. Work other than the quizzes is to be completed individually.

Course Policy regarding use of electronic devices and recording of lectures:

Electronic recording of classes is expressly forbidden. Laptops are permitted for course related use. Keep your phone in your pocket, purse, knapsack.

University Policies

Academic Consideration

When you find yourself unable to meet an in-course requirement because of illness or compassionate reasons, please advise the course instructor in writing, with your name, id#, and e-mail contact. See the academic calendar for information on regulations and procedures for Academic Consideration:
Academic Consideration, Appeals and Petitions

Academic Misconduct

The University of Guelph is committed to upholding the highest standards of academic integrity and it is the responsibility of all members of the University community, faculty, staff, and students to be aware of what constitutes academic misconduct and to do as much as possible to prevent academic offences from occurring.

University of Guelph students have the responsibility of abiding by the University's policy on academic misconduct regardless of their location of study; faculty, staff and students have the responsibility of supporting an environment that discourages misconduct. Students need to remain aware that instructors have access to and the right to use electronic and other means of detection. Please note: Whether or not a student intended to commit academic misconduct is not relevant for a finding of guilt. Hurried or careless submission of assignments does not excuse students from responsibility for verifying the academic integrity of their work before submitting it. Students who are in any doubt as to whether an action on their part could be construed as an academic offence should consult with a faculty member or faculty advisor.

The Academic Misconduct Policy is detailed in the Undergraduate Calendar:
Academic Misconduct Policy

Accessibility

The University of Guelph is committed to creating a barrier-free environment. Providing services for students is a shared responsibility among students, faculty and administrators. This relationship is based on respect of individual rights, the dignity of the individual and the University community's shared commitment to an open and supportive learning environment. Students requiring service or accommodation, whether due to an identified, ongoing disability or a short-term disability should contact the Centre for Students with Disabilities as soon as possible.

For more information, contact CSD at 519-824-4120 ext. 56208 or email csd@uoguelph.ca or see the website: **Student Accessibility Services Website**

Course Evaluation Information

Please refer to the **Course and Instructor Evaluation Website** .

Drop date

The last date to drop one-semester courses, without academic penalty, is Friday November 2. For regulations and procedures for Dropping Courses, see the Academic Calendar: **Current Undergraduate Calendar.**