01:185:416:01 Advanced Topics in Cognitive Science: Minds, Machines & Computation

Spring 2020
Time: MW5 (2:50 – 4:10 pm)
Classroom: SC-204

Contact Information

Instructor: Dr. Bruce Tesar
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Office: SEM 203
Office Hours: Wednesdays 11 am - 12 noon, or by appointment

Prerequisites

01:185:201 Cognitive Science: A Multidisciplinary Introduction

Description

This course examines the central stance of Cognitive Science: that human cognition is best understood in terms of information processing, that is, computation. It will examine some of the requirements that cognition imposes on its physical realization, and examine how such requirements have been approached in traditional computational systems. Topics of focus will include representations, memory, and brain function as a form of computation. Students will get a little "hands on" experience with implementations of a logical reasoning system and of a neural network learning system.

Learning Goals

By the end of this class, students should:

- Understand some basic concepts of computation.
- Have some basic experience working with both a logical reasoning system and a neural network learning system.
- Be familiar with some of the requirements that cognition imposes on its physical realization.
- Understand some basic concepts of computational learning.

Materials

Text

Gallistel, C. R., and Adam Philip King. 2009. *Memory and the Computational Brain*. Wiley-Blackwell. ISBN 978-1-4051-2288-7 (paperback)

Available from the Rutgers University Bookstore, CAC, for $66.95.

Prolog Software

Parts of this course will use the freely available SWI-Prolog software. Implementations for most computing platforms, including Microsoft Windows and MacOS (Apple), can be downloaded from the main website for the software at https://www.swi-prolog.org/. You should download the most current **stable release**.

Network Simulator Software

Part of this course will make use of a freely available neural network simulator called Basic Prop. The website for the simulator is https://basicprop.wordpress.com/. The software is available as a self-contained Java executable file, and should run on any computer with Java (**not** Javascript) installed on it.

Canvas Site

The Canvas site for the course is **2020SP - ADV:COG-MINDMACHCOMP 01:185:416:01**. Handouts and problem sets will be downloadable from this site, and grades and last-minute announcements will be posted there. Make sure that you have you have your Canvas options set so that notifications will reach you quickly, via e-mail or some other avenue.

Requirements

Questions on the Readings 20%

For each assigned reading, students are required to post at least one substantive question about the reading to the corresponding discussion in the Discussions section on Canvas.

Problem Sets 55%

Several problem sets will be given during the semester. Students will typically have a week to complete each problem set. Late problem sets will not be accepted. An assignment that is not submitted on time will receive a score of zero. **If you have an extensive problem, such as a medical issue, that makes it impossible to turn in a problem set on time, inform the**

instructor, and document the problem through your area dean. Once the area dean has verified the problem, we will work out a reasonable plan for you to complete the work for credit.

Problem sets must be submitted as a PDF file via Canvas, in the Assignments section. Each assignment must be successfully uploaded by 12 noon on the due date.

Collaboration between students on graded problem sets is not permitted unless explicitly specified by the instructor for a particular assignment.

Final Exam 25%

There will be an in-class final exam given at **Wed. May 13, 12 noon – 3 pm**. The exam will take place in the normal classroom.

Exercises

Exercises will be assigned often; they will be discussed in class, but not graded. Students may freely work together on exercises.

Extra Credit

Participate in an experiment! The Linguistics Department runs experiments. You can participate in these experiments and get extra credit worth up to two percentage points towards your final grade. For further information, click on this link: Linguistics Experimental Participation.

Attendance Policy

Students are expected to attend all classes, and that includes arriving before class begins. Students should use the University absence reporting website https://sims.rutgers.edu/ssra to indicate the date and reason for necessary absences (an email is automatically sent to me). This includes absences for religious observances, health issues, and university activities. If a student must miss classes for a period longer than one week, they must see their Dean of Students for assistance in verifying the circumstances of the absence.

Academic Integrity

The Rutgers University Academic Integrity Policy is available online on the university's Academic Integrity website. If you are uncertain about whether a particular action is permitted, **please ask the instructor first**.

The simple principle for this course is that **if something is handed in for a grade (problem sets, exams), you should not discuss it with anyone other than the instructor**. For anything else (exercises, study, general questions on course material), discussing with fellow students or others outside of the class is fine. Contact the instructor to clear up any confusion or uncertainty you have about a problem set.

On in-class exams, you are expected to do purely your own work, and not to communicate with anyone else (inside or outside the classroom), or glance at a fellow student's exam paper. You only need to bring pencils and an eraser; the instructor will provide any other materials for the exam. No academic materials (books, notes) may be used during the exam, and no electronic devices may be used (they should be turned off during the exam).

Anonymous Comments to the Instructor

Students are encouraged to speak with the instructor directly about any concerns they have regarding the course. However, if you would feel more comfortable sending comments about a particular issue anonymously, students are welcome (but not required) to use the link below at any time during the semester. It is especially useful for pointing out an issue during the semester while there is potentially still time to address the issue.

To send anonymous comments to the instructor, copy and paste the URL below into your browser.

https://docs.google.com/forms/d/1sVDeqT2tlopUnQYtBFBHKtXjfHs5ssIh554IAsx_7HI/viewform?usp=send_form

This uses a ScarletDocs form (part of Rutgers ScarletApps). Text entered into the form is passed on to the instructor when the Submit button is pressed, without any indication of who entered the text.