

Syllabus

CISC 453: Topics in AI

Description:

This term we will be learning about and discussing the big stumbling blocks AI has been struggling with since the 1960's — representation, meaning, action, the changing environment — and looking at one very new approach to dealing with them. Since we learn better when we *do*, we will be augmenting our readings and discussions with a great deal of hands-on activities of various sorts. Thematically, the term will be divided into two halves: during the first six weeks, we will experience the problems of classical AI first-hand by working with a symbolicist AI system — CYC (www.cyc.com) — and exploring issues of knowledge representation and natural language understanding; during the second six weeks, we will switch gears and experiment with one of the newest AI modelling systems on the scene, Nengo, a neural simulator, to see if it can give us new insight into these classical problems. Readings will play a central role in the class: there will be many classical readings in the philosophy of mind and cognitive science that will serve as essential conceptual background for the discussions and activities we engage in. Doing these readings is essential to success in this class.

Texts:

- Eliasmith, C. 2014. *How to build a brain*.
- Handouts (available on website)

Class Policies:

During the lecture portion of each class (see below for more detail on class procedure), electronic devices such as laptops, tablets, and phones are not permitted. You may take notes by hand during this part of class, if necessary. There will be time during the rest of the class for you to take down your notes electronically.

Class Procedure:

There will be one three hour class each week. We are very fortunate to be in one of only three interactive classrooms on campus and we will make good use of the facilities. During the first hour of every class, I will talk about the week's reading and introduce the central concept for the week. The class will then break into small groups and begin work on that week's assignment. Typically 30-45 minutes will be allotted for the research component of the assignment. After a short break the teams will present their findings to the rest of the class. The team assignments and the presentations, which will be more of a discussion format than lecture, are designed to lead us more deeply into the week's concept.

Readings:

Check the website or the calendar in this syllabus for the next week's readings. Note: in-class work and test questions will be based on these readings. In other words, you cannot do well in this course without doing the readings.

Evaluation:

2 Projects: 20% each – 40%
 2 In-Class Tests: 15% each – 30%
 5 Team Assignments: 6% each – 30%

Projects

Details are posted separately on the site.

Team Assignments:

As you can see on the calendar, there are six team assignments throughout the term, but you are required to hand in only five. That means that if you miss one, because you are sick or are otherwise unable to attend class, you will still have five other opportunities to participate. If you miss more than one, however, even because you are sick, you will just lose however many percent that works out to, depending on how many of these you miss. Remember that each class is the equivalent of an entire week of classes. If you miss more than one of these, you will have missed too much class material to adequately complete the course. People who find themselves in this situation, because they have become very ill, will need to contact me a.s.a.p. with medical notes. Depending upon how many classes have been missed, the only course of action might be to apply to drop the course without academic penalty.

Grading of team assignments will be on an individual basis. This means that you might end up with a different grade from that of your other teammates.

Team Assignment Marking Rubric		
Participation in the group effort	Effectiveness in team role	Clarity and comprehensiveness during presentation

Class Marking Scheme:

Each deliverable will receive a numerical percentage mark. The final grade you receive for the course will be derived by converting your numerical course average to a letter grade according to Queen's Official Grade Conversion Scale.

<i>Deliverable Due Dates</i>	
Project 1	Feb 22 – Posted by midnight
Project 2	Apr 4 – Posted by midnight
Test 1	Feb 8 – In class
Test 2	Mar 28 – In class
TA 1	Jan 11 – In class
TA 2	Jan 25 – In class
TA 3	Feb 1 – In class
TA 4	Feb 29 – In class
TA 5	Mar 7 – In class
TA 6	Mar 14 – In class

Late Penalties: 2.5% per day up to two weeks for projects, after which time the project will not be accepted. Extensions will be granted only when a request is made in *advance* of the deadline AND a note (generally from a doctor) is presented.

Note: Reasons for an extension that will not be considered include the following: too many other assignments due at the same time; out of town; computer breakdown.

Moodle:

General: I have set up a site for this class on Moodle. (NOTE: If you cannot access it, please let me know immediately.) You should get into the habit of checking there regularly, at least once a week, for notices, changes to the curriculum, and so on. Also make sure to check Moodle before you come in for office hours – if there are changes to the hours for the week, I will try to post those changes as early in the week as possible, but sometimes unexpected events occur and I may have to make a last minute change.

Forums: Feel free to use the Discussion forum to post questions and to discuss issues amongst yourselves. Also be sure to check regularly for Announcements — this is the topic I will use to make class announcements. If you post a question under Help Desk, I will do my best to answer it within the week. If your question is involved or is a general content sort of question, please raise it in class rather than on the forums – that's what class-time is for.

Questions and E-mails:

If you have any questions, it is likely that someone else has the same question as well. Please use in-class time for asking such questions and reserve office hours and e-mail for personal questions. If you do send an e-mail, the subject line should read as follows: **CISC 453**. Use e-mail for urgent or personal correspondence only.

Academic Integrity:

Plagiarism will not be tolerated. **Do your own work.** Some of you might not be aware of what constitutes plagiarism. Here is an excerpt from the Queen's website on Academic Integrity:

➤ **"Plagiarism (presenting another's ideas or phrasings as one's own without proper acknowledgement)**

➤ Examples: copying and pasting from the internet, a printed source, or other resource without proper acknowledgement; copying from another student; using direct quotations or large sections of paraphrased material in an assignment without appropriate acknowledgement; submitting the same piece of work in more than one course without the permission of the

instructor(s)."

Be sure to read the entire page on academic integrity:

http://www.queensu.ca/calendars/artsci/Regulation_1_Academic_Integrity.html

Class Information:

Class Time: Mon 6:30-9:30

Class Location: Ellis Hall 318

Contact Information:

Professor: Nancy Salay

Office: Watson Hall 322

Phone: 533-6000 ext.

Office Hours: Thursdays: 2:30 – 3:45

E-Mail: salay@queensu.ca

Calendar on next page...

Calendar

Week	Topics	Readings	Deliverables
1	Course Overview; Introduction; What is Intelligence?		Activity: Watson
2	The Grounding Problem	— S. Harnad. 1990. The Symbol Grounding Problem. — R. Brooks. 1990. Elephants Don't Play Chess.	Team Assignment 1: The Grounding Problem
3	The Frame Problem; Cyc Browser	— H. Dreyfus. 2007. Why Heideggerian AI failed ... — A. Clark. 2002. Skills, spills and the nature of mindful action.	Activity: Browsing
4	Making Assertions; Creating Constants	— Cyc Documentation	Team Assignment 2: Jello
5	Inference Engine, Mts, Visibilty	— Cyc Documentation	Team Assignment 3: Jello Inferences
6	Conclusions		Test 1 (Second Half of Class)
READING WEEK			
7	Representation; Situated Cognition; Intro to Nengo	— Clark. 1994. Doing without Representing? — L. Barsalou. 2009. Simulation, Situated Conceptualisation and Prediction — HBB: Chpt 1	Project 1 Due Activity: Getting familiar with Nengo
8	An introduction to basic neurophysiology and anatomy; Principle 1 of the NEF - representation	— HBB: 2.2; 2.2.1	Team Assignment 4: Build a model of 1D representation
9	Principle 2 of the NEF – computation; Alternatives to Representationalism	— HBB: 2.2.2 — W. Freeman	Team Assignment 5: Concepts — Neural Representation
10	Principle 3 of the NEF - dynamics	— HBB: 2.2.3	Team Assignment 6: Build a model of a 1D integrator
11	Catch-Up and Review	— Summation Paper: Maybe Eliasmith JoP paper?	Activity: Catch-up
12	Conclusions		Test 2 (Second Half of Class)
	CLASSES FINISHED		Project 2 Due