CS 3600: Introduction to Artificial Intelligence
a.k.a Intro to Intelligent Agents
a.k.a Intro to Intelligent Systems

Time: MWF 3:05-3:55am
Classroom: ES&T L1255
http://www.cc.gatech.edu/classes/

Instructor: Prof. Mark Riedl
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Office Hours: MWF 4:30-5:30pm, and by appointment

TA: Richard Roberts
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CCB 2nd floor graduate student area (call Richard @ 404-493-5064 if you can't get in)
Office Hours: T 3-4pm, W 1:30-2:30pm, and by appointment

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TSRB 225
Office Hours: M 11:30-12:30, F 1:30-2:45

1 General Information

Introduction to Intelligent Systems is a three-credit undergraduate course on Artificial Intelligence. The class is called Introduction to Intelligent Systems instead of Introduction to Artificial Intelligence to emphasize that we intend to approach AI from the point of view of building intelligent agents, environments and systems. In particular, you will learn about the methods and tools that will allow you to build complete systems that can interact intelligently with their environment by learning and reasoning about the world.

2 Objectives

There are three primary objectives for the course: To provide a broad survey of AI and Intelligent Systems; To develop a deeper understanding of several major topics in AI; To develop the design and programming skills that will help you to build intelligent artifacts. In practice, you should develop enough basic skills and background that you can pursue any desire you have to learn more about specific areas in IS, whether those areas are planning, knowledge representation, machine learning, vision, robotics or whatever. In particular, this class provides a useful foundation for a number of courses involving intelligence systems, including Machine Learning (CS4641), Knowledge-Based AI (CS4634), Computer Vision (CS4495), Robotics and Perception (CS4632), Natural Language Understanding (CS4650) and Game AI (CS4731).

3 Prerequisites

Someone once said that the trick to doing AI is coming up with a good representation.

That's not quite all there is to it, but it's close enough, so to succeed at this class, you should know a bit about data structures and algorithms. At the very least, you will have to be able to read pseudocode and understand basic algorithms as they are presented to you.

Someone else one defined AI as finding fast algorithms for NP-hard problems. Again, that's not quite all there is to it, but it's not too far from the truth, so it also turns out that a familiarity with (or at least a lack of abject fear over) some basic theory helps to situate many of the algorithms.

As the semester continues, it turns out that a familiarity with basic probability theory will also be very useful; however, we will spend some time on that in class in order to refresh your memory. Finally, you should feel pretty comfortable programming on your own. Many of the projects will be in LISP, and perhaps one or two will be in C. We will spend very little time explaining these languages in class; at this point in your career you've been exposed to several programming language and are expected to be able to readily acquire new programming language skills.

4 Resources

Required Text: Artificial Intelligence: A Modern Approach
Second Edition (the green book) by Russell & Norvig, 2002.

Optional Text: Lisp
Third Edition by Winston & Horn, 1989.

Readings. The textbook for the course is the second edition of *Artificial Intelligence: A Modern Approach* by Russell and Norvig. There are significiant differences between it and the first edition, so be sure to have the right edition. We will follow the textbook quite closely (although time will not permit us to cover all of the chapters), so it is imperative that you have a copy of the book. We may occasionally use supplemental readings as well, but those will be provided for you. The *Lisp* book is for your own reference in learning lisp, the language that most of your projects will be implemented in. There will be in class lessons on lisp as well as numerous web resources to assist you here, but the book can be invaluable.

Computing. You will have access to CoC clusters for your programming assignments. You can use whatever machines you want to do the work; however, the final result will have to run on the standard CoC boxes. Exactly what this means will be spelled out on each assignment. This shouldn't be much of a restriction for you.

- Allegro Common Lisp installed in the following labs:
  - Thin-Client Lab (CCB 130)
  - Baird Lab (CCB 107A)
  - Remote access unix machines
- Download your own:
  - Unix: Clisp (http://www.clisp.org/)
  - All platforms (limited heap size): Allegro Common Lisp (http://www.franz.com/downloads/)
  - Others

Web. We will use the class web page for most information, and T-Square for project submission. Aside from that, if you want to learn more about intelligent systems or artificial intelligence, you can find an enormous amount just by typing in keywords in google (or whatever your favorite search engine is). One good place to start is with AI on the Web. It's also worth pointing out that Georgia Tech enjoys one of the largest IS groups around and our interests are quite broad, so surfing faculty web pages can also be enlightening.

5 Grading

Homework: Assignments will be made regularly, these will be worth 0% of your final grade. These are for your own good. If you keep up with, and do well on the homework assignments, it is very likely you will do well on the exams.

Projects: There will be 10 projects throughout the semester, these will be worth 35% of your final grade.

Exams: There will be a mid-term and a final exam, worth 30% and 35% of your final grade, respectively.

Class Participation: This is not part of your final grade, but may be used to determine boundary cases.

6 Schedule

You are responsible for the assigned reading material. Check the web page frequently for any modifications to this schedule.

Date	Topic	Reading	Out	In
Jan 5	Intro to AI	Ch 1-2		
Jan 7	Agents	Ch 1-2		
Jan 9	Agents	Ch 1-2		
Jan 12	Intro to lisp	Winston Ch 1-7	Project 1,2	
Jan 14	Intro to lisp			
Jan 16	Search	Ch 3	Hw 1	
Jan 19	School holiday			
Jan 21	Search	Ch 3		Project 1 (lisp)
Jan 23	Search	Ch 3		
Jan 26	Search	Ch 4		Project 2 (lisp)
Jan 28	Search	Ch 4		
Jan 30	Search	Ch 4		
Feb 2	Game playing	Ch 6	Project 3,4 Hw 2	
Feb 4	Game playing	Ch 6		
Feb 6	Modern game AI			
Feb 9	Modern game AI			
Feb 11	Constraint satisfaction	Ch 5		
Feb 13	Constraint satisfaction	Ch 5		
Feb 16	Logical agents, FOL	Ch 7	Project 5,6 Hw 3	Project 3 (game)
Feb 18	Logical agents, FOL	Ch 7		
Feb 20	First order logic	Ch 8	Hw 4	
Feb 23	FOL inference	Ch 9		Project 4 (game)
Feb 25	FOL inference	Ch 9		
Feb 27	Mid-term review			
Mar 2	Mid-term exam			
Mar 4	Planning	Ch 11	Hw 5	
Mar 6	Planning	Ch 11		
Mar 9	Planning	Ch 11		Project 5 (logic)
Mar 11	Planning in the real world	Ch 12	Hw 6	

(drop day)				
Mar 13	Planning in the real world	Ch 12		
Mar 16	Spring break			
Mar 18	Spring break			
Mar 20	Spring break			
Mar 23	Reasoning with uncertainty	Ch 13	Project 7 Hw 7	Project 6 (logic)
Mar 25	Reasoning with uncertainty	Ch 13		
Mar 27	Reasoning with uncertainty	Ch 14		
Mar 30	Reasoning with uncertainty	Ch 14		
Apr 1	Decision making	Ch 17	Project 8 Hw 8	
Apr 3	Decision making	Ch 17		
Apr 6	Learning	Ch 18	Project 9 Hw 9	Project 7 (bayes)
Apr 8	Learning	Ch 18		
Apr 10	Learning	Ch 18		
Apr 13	Learning	Ch 20		
Apr 15	Learning	Ch 20		
Apr 17	Learning	Ch 20		
Apr 20	Natural language	Ch 22-23		Project 8 (markov)
Apr 22	Natural language	Ch 22-23		
Apr 24	Natural language	Ch 22-23		
Exam week				Project 9 (sup. learning)

7 Legalese

I reserve the right to modify any of these plans as need be during the course of the class; however, I won't do anything too drastic, and you'll be informed as far in advance as possible.

I expect you to understand and follow the honor code.