CS 3600: Introduction to Artificial Intelligence
Fall 2016

Time: Monday, Wednesday, Friday 10:05-10:55pm
Classroom: Clough Commons 152

http://www.cc.gatech.edu/~riedl/classes/2016/cs3600/

Instructor: Prof. Mark Riedl
Email: riedl@cc.gatech.edu
Office: Technology Square Research Building, 228
Office Hours: Tuesdays 2:30-4:30pm, and by appointment

TAs: see course website.

1. General Information

Introduction to Artificial Intelligence is a three-credit undergraduate course emphasizing the building of agents, environments, and systems that can be considered as acting intelligently. 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; 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. All projects will be implemented in Python. We will spend no time explaining 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, Third Edition (the **blue** book) by Russell & Norvig, 2010.

Readings. The textbook for the course is the third edition of *Artificial Intelligence: A Modern Approach* by Russell and Norvig. There are significant differences between it and the first two editions, 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.

Web. We will use the class web page for the schedule, projects, and homework exercises. We will use T-Square for project submission and critical announcements. We will use a course management site called Piazza for general questions and discussions.

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" (see course website).

It's also worth pointing out that Georgia Tech enjoys one of the largest Intelligent Systems groups around and our interests are quite broad, so surfing faculty web pages can also be enlightening.

5. Grading

Practice Homeworks: 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.

Programming Assignments: There will be 4 graded projects throughout the semester; these will be worth a total of 60% of your final grade.

Exams: There will be a mid-term and a final exam, worth 20% and 20% of your final grade, respectively.

Class Participation: Participation means attending classes, participating in class discussions, asking relevant questions, volunteering to provide answers to questions, and providing constructive criticism and creative suggestions that improve the course or the textbook. Participation will be 0% of your grade; class participation to determine whether your grade can be lifted in case you are right on the edge of two grades.

6. Tentative Schedule

You are responsible for the assigned reading material. Check the web page frequently for any

modifications to this schedule.

Week	Date	Topic	Reading	Due
1	8/22	Intro to AI	Ch. 1	
	8/24	Agents and environments	Ch. 2	
	8/26	Agents and environments	Ch. 2	
2	8/29	Agents and environments	Ch. 2	Project 0
	8/31	Search	Ch. 3	
	9/2	Search	Ch. 3	
3	9/5	Holiday		
	9/7	Search	Ch. 3	
	9/9	Search	Ch. 3	
4	9/12	Search	Ch. 3	
	9/14	Search	Ch. 4	
	9/16	Search	Ch. 4	
5	9/19	Game playing	Ch. 5	
	9/21	Game playing	Ch. 5	
	9/23	Constraint satisfaction	Ch. 6	
6	9/26	Constraint satisfaction	Ch. 6	Project 1 (9/25 at 11:55pm)
	9/28	Constraint satisfaction	Ch. 6	
	9/30	Logical agents	Ch. 7	
7	10/3	Logical agents	Ch. 7	
	10/5	Logical agents	Ch. 7	
	10/7	Logical agents	Ch. 8-9	
8	10/10	Fall Break		
	10/12	Reasoning with uncertainty	Ch. 14	Project 2 (10/11 at 11:55pm)
	10/14	Reasoning with uncertainty	Ch. 14	
9	10/17	Midterm		
	10/19	Reasoning with uncertainty	Ch. 14	
	10/21	Reasoning with uncertainty	Ch. 14	
10	10/24	Reasoning with uncertainty	Ch. 14	
	10/26	Probabilistic reasoning over time	Ch. 15	
	10/28	Probabilistic reasoning over time	Ch. 15	
11	10/31	Probabilistic reasoning over time	Ch. 15	
	11/2	Decision making	Ch. 17	
	11/4	Decision making	Ch. 17	
12	11/7	Decision making	Ch. 17	Project 3 (11/6 at 11:55pm)
	11/9	Decision making	Ch. 17	
	11/11	Decision making	Ch. 17	
13	11/14	Learning	Ch. 18	
	11/16	Learning	Ch. 18	
	11/18	Learning	Ch. 18	
14	11/21	Learning	Ch. 18	
	11/23	Holiday		
	11/25	Holiday		
15	11/28	Neural networks and deep learning	Ch. 18	
	11/30	Neural networks and deep learning	Ch. 18	
	12/2	Neural networks and deep learning	Ch. 18	
16	12/5	Other stuff		Project 4 (12/4 at 11:55pm)

Exam	12/12	Final exam (11:30am - 2:20pm)		

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.

You need to abide by the academic honor code of Georgia Tech.

You may collaborate as much as you want on the ungraded homework problems. During exams you may not so much as daydream about working with someone else. On the programming projects, your submitted solutions must reflect your own work.

All projects are to be completed individually. For the projects, do not copy from others or let others copy your work; however, you may think of the TAs as your close collaborators. Feel free to go to them with any problems that you are having. That's why they are there.

You may speak with other students in the class about programming assignments. If you do so, I recommend that you do not do so in front of a computer. This will prevent the temptation to copy code. "Whiteboard policy": if you need to write something to communicate with a peer about an assignment, write by hand on a whiteboard or piece of paper. Erase the board (or destory the paper) and do not take a picture of the board. The whiteboard policy is designed to protect you: I cannot tell who copied whom and both may be persecuted.

Do not store your programming assignment solutions on an un-protected online source repository (e.g., Bitbucket, GitHub, etc.). This invites cheating with repercussions to both parties. It goes without saying that one should not download solution code.