CS 3600: Introduction to Artificial Intelligence

Time: Monday, Wednesday, Friday 12:05-12:55pm
Classroom: Clough Undergraduate Commons 152

Instructor: Prof. James M. Rehg
Office Hours: TBD

Lead TA: Oleg Filatov (ofilatov3@gatech.edu)
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Office Hours and Locations: TBD

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), KnowledgeBased 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.

Slides: Slides will be released to resource folder of T-square by the end of the week, so the errors and typos could be eliminatied after lectures.

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.

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.

Also, lots of resoruces such as previous homeworks & solutions are avaible from previous class website: http://www.cc.gatech.edu/~riedl/classes/2013/cs3600/index.html

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

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 **4 graded projects** and 1 non-graded project throughout the semester; these will be worth a total of 35% of your final grade.

Midterm Exam: The midterm exam will be worth 30% of your final grade. It will be held on **TBD** during class period. If you request taking the exam at a different time, you will need to provide a written documentation of your excused absence. I reserve the right to give you a different exam that may be harder than the original, and I do not any award partial credit when grading make-up exams. Thus, it is in your best interest to plan to be at the midterm, and not fall suddenly ill on the morning of the exam.

Midterm Details: The midterm will be open notes, closed book. You are allowed to bring 8 pages of notes (4 pieces of 8.5 x 11 paper, double-sided). Please note that you can use the space on these pages any way that you choose. You are not allowed to bring your book. The midterm will begin at 12:05pm and end at 12:55pm. If you are traveling across campus, please make arrangements to leave your other class early so that you can reach our class on time. If you speak with your professor in advance, they will understand.

Final Exam: The final example will be worth 35% of your final grade. It will be held on **TBD**. There is zero flexibility in rescheduling this exam, the date and time is set by the institute. The final will be open notes, closed book. You are allowed to bring 8 pages of notes (4 pieces of 8.5 x 11 paper, double-sided). Please note that you can use the space on these pages any way that you choose. You are not allowed to bring your book. You should bring a calculator if possible, as some of the exercises could require some multiplication, addition, etc. that would be tedious to do by hand. Any standard calculator will be fine, you won't need any special functions, programming capabilities, etc. You may want to bring a watch as the clock in our classroom can be difficult to see from certain seating locations.

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 may be used to determine whether your grade can be lifted in case you are right on the edge of two grades.

6. Notes for Projects

The Projects are Long. The due dates for these projects are listed in the schedule below, will be announced in class, and via t-square. You are given several weeks for each project because they are significant. So you should plan to spend much more than the weekend before the due date. Start early and take advantage of the TAs office hours. **Every year about half of the class does not complete at least one project, because they didn't realize how much time it would take.** Don't be in this half of the class!

Late Policy. All the projects will due at 11:55pm on Sunday. Late assignments will not be accepted, once the t-square submission is closed your opportunity to receive credit for the assignment is over. So even if you're not done, submit what you have by the deadline if you want to receive any partial credit for the assignment.

Honor Code. These are not collaborative projects. You are expected to do your own work. Talking about algorithms and ideas is fine, but everyone must complete their own implementation. You are prohibited from making project solutions publicly available on the Internet. Any incident of cheating will result in a zero for the assignment, and may result in disciplinary action by the institute. **Please**

note that we will be using MOSS to analyze the project submissions for evidence of cheating.

7. Tentative Schedule

THE FOLLOWING SCHEDULE IS COPIED FROM SPRING 2015 AND IS NOT ACCURATE
The current schedule will be updated by this Friday. The lectures are from last year as well, and will be replaced by this year's lectures as they become available.

In general the schedule is subject to change, so check T-Square frequently for any modifications to this schedule.

Week	Date	Topic	Read	Notes
1	Jan. 5	Intro	Ch. 1	
	Jan .7	Agents & Environments	Ch. 2	Project 0 release (no due)
	Jan. 9	Agents & Environments	Ch. 2	Project 1 release
2	Jan. 12	Problem Solving Agents	Ch. 3	
	Jan. 14	Problem Solving Agents	Ch. 3	
	Jan. 16	Problem Solving Agents	Ch. 3	
3	Jan. 19	Holiday		
	Jan. 21	Local Search	Ch. 4	
	Jan. 23	Local Search	Ch. 4	
4	Jan. 26	Local Search	Ch. 4	
	Jan. 28	Adversarial Search	Ch. 5	
	Jan. 30	Adversarial Search	Ch. 5	**Project 1 Due (Feb. 1)**
5	Feb. 2	Constraint Satisfaction	Ch. 6	
	Feb. 4	Constraint Satisfaction	Ch. 6	Project 2 release
	Feb. 6	Intro to Behavioral Imaging		
6	Feb. 9	Logical Agents	Ch. 7	
	Feb. 11	Logical Agents	Ch. 7	
	Feb. 13	Logical Agents	Ch. 7	
7	Feb. 16	No class		
	Feb. 18	Logical Agents	Ch. 7	
	Feb. 20	**Midterm Review**		
8	Feb. 23	**Midterm Exam**		
	Feb. 25	No Class		
	Feb. 27	Midterm Reivew		Withdraw day / **Project 2 Due (Mar. 1)**
9	Mar. 2	No class		
	Mar. 4	Probability	Ch. 13	Project 3 release
	Mar. 6	Probability	Ch. 13	
10	Mar. 9	Bayes Nets	Ch. 14	
	Mar. 11	Bayes Nets	Ch. 14	
	Mar. 13	Discussion of Project 3		
11	Mar. 16	Spring Break		
	Mar. 18	Spring Break		
	Mar. 20	Spring Break		
12	Mar. 23	Dynamic Bayes Nets	Ch. 15	
	Mar. 25	Dynamic Bayes Nets	Ch. 15	
	Mar. 27	Dynamic Bayes Nets	Ch. 15	**Project 3 Due (Mar. 29)**

13	Mar. 30	Learning Agents	Ch. 18	
	Apr. 1	Learning Agents	Ch. 18	Project 4 release
	Apr. 3	Learning Agents	Ch. 18	
14	Apr. 6	Learning Agents	Ch. 18	
	Apr. 8	Learning Agents	Ch. 18	
	Apr. 10	Deep Learning	-	
15	Apr. 13	First Order Logic	Ch. 8	
	Apr. 15	First Order Logic	Ch. 9	
	Apr. 17	Decision Making Agents	Ch. 17	**Project 4 Due (Apr. 19)**
16	Apr. 20	Decision Making Agents	Ch. 17	
	Apr. 22	AI Applications		
	Apr. 24	Final Exam Review		
17	Apr. 27			
	Apr. 29	**Final Exam**		