ECE 448: Artificial Intelligence **Spring 2023**

Instructor:
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Time and Location:
Time: Thursday 14:30-17:20 pm
Location: Lecture Theatre East 207

Description：
Artificial Intelligence is a one-semester course for students of bachelor's degree. The students are required to participate in weekly lectures and complete five machine problems. This course provides an introductory survey of concepts and techniques in artificial intelligence. We will cover methods for search, classification, reasoning, and machine learning. We will also look at applications including core AI (games, planning), robotics, computer vision, and natural language understanding. Have a look at teaching schedule for more detailed information.

Prerequisite:
This course assumes that you have taken data structures (CS 225) and therefore, by transitivity, Discrete Structures and Calculus I. A probability and/or statistics course (e.g. ECE 313) is strongly recommended. It is intended to be a first course in AI. If you have already taken a specialized AI course (e.g. CS 446), be prepared to review some familiar material.

Textbook:
None
You will need a reference for Python, which we will use to write the MPs. A good place to start is the Python Tutorial

Exams:
Exams are short answer format, closed book, closed notes, no electronic devices.

Grading Policy:
MPs (5): 60%
Exam (2): 40%
Attendance: 2-3%

Lectures:
Lecture 1: What is AI?
Lecture 2: History and Themes
Lecture 3: Agents and Rationality
Lecture 4: Search Intro
Lecture 5: Search Informed by lookahead heuristics: Greedy, Admissible A*, Consistent A*
Lecture 6: Constraint Satisfaction Problems
Lecture 7: Planning and Theorem Proving
Lecture 8: Two-Player Games
Lecture 9: Game Theory
Lecture 10: Probability
Lecture 11: Random Variables
Lecture 12: Stochastic Games, Stochastic Search and Learned Evaluation Functions
Lecture 13: Naïve Bayes
Lecture 14: Bayesian Inference and Bayesian Learning
Lecture 15: Linear Classifiers-Bayesian, Perceptron, Logistic Regression
Lecture 16: Polychotomizers: One-Hot Vectors, SoftMax and Cross-Entropy
Lecture 17: Bayesian Networks
Lecture 18: Bayes Net Inference
Lecture 19: Hidden Markov Models
Lecture 20: Markov Decision Processes
Lecture 21: Reinforcement Learning
Lecture 22: Deep Learning
Lecture 23: Deep Reinforcement Learning
Lecture 24: Natural Language Processing with Neural Nets
Lecture 25: Speech
Lecture 26: Societal Impact of AI

Detailed Schedule:

Date	Index	Topic	Due
2/16	Week 1	Lecture 1: What is AI?	
		Lecture 2: History and Themes	
2/23	Week 2	Lecture 3: Agents and Rationality	
		Lecture 4: Search Intro	
3/2	Week 3	Lecture 5: Search Informed by lookahead heuristics	
		Lecture 6: Constraint Satisfaction Problems	
3/9	Week 4	Lecture 7: Planning and Theorem Proving	MP1
		Lecture 8: Two-Player Games	
3/16	Week 5	Lecture 9: Game Theory	
		Lecture 10: Probability	
3/23	Week 6	Lecture 11: Random Variables	
		Lecture 12: Stochastic Search and Learned Evaluation Functions	
3/30	Week 7	Lecture 13: Naïve Bayes	
		Midterm Exam	MP2
4/6	Week 8	Lecture 14: Bayesian Inference and Bayesian Learning	
		Lecture 15: Linear Classifiers	
4/13	Week 9	Lecture 16: Polychotomizers	
		Lecture 17: Bayesian Networks	
4/20	Week 10	Lecture 18: Bayes Net Inference	MP3
		Lecture 19: Hidden Markov Models	
4/27	Week 11	Lecture 20: Markov Decision Processes	
		Lecture 21: Reinforcement Learning	
5/4	Week 12	International Labors Day	
5/11	Week 13	Lecture 22: Deep Learning	
		Lecture 23: Deep Reinforcement Learning	
5/18	Week 14	Lecture 24: Natural Language Processing with Neural Nets	MP4
		Lecture 25: Speech	
5/23	Week 15	Lecture 26: Societal Impact of AI	
		Review of Final Exam	MP5

Course Policies:

Academic integrity: You are encouraged to discuss assignments with each other, but coding and writing of reports must be done individually or in your designated groups. You are also encouraged to conduct this discussion online, but do not post code on the class discussion group, either for the purpose of debugging or demonstrating a possible solution. Feel free to search the Web for tips or code snippets, provided this does not make the assignment trivial and all external sources are explicitly acknowledged in the report. At the first instance of cheating (copying from other students or unacknowledged sources on the Web), a grade of zero will be given for the respective assignment or test. At the second instance, you will automatically receive an F for the entire course.

Late penalty on assignments: For every day that your assignment is late, your score is multiplied by 0.9. No homework may be submitted more than 7 days late.

Only one submission per group: You may submit each assignment as often as you wish, but only one submission per group will be graded. Unless you tell us otherwise, we will grade your last submission before the deadline. If you wish us to grade a section that was submitted after the deadline, then a late penalty will apply to the entire assignment.

Regrade requests: Regrade requests will only be accepted within a week after grades are released for an assignment and within 24 hours after grades are released on an exam. Note that the course staff reserves the right to regrade not only the items questioned by the student, but also the entire assignment or test. This may result in your overall score actually going down!

Incomplete requests: Requests for an incomplete in the course will only be accepted through the last day of class and must be accompanied by documentation of your special circumstances.