State University of New York Polytechnic Institute
CS 540/495 : Artificial Intelligence
Spring 2016

Instructor:	Dr. Chen-Fu Chiang
Time:	MW 10:00 am - 11:50 am
Location:	Kunsela Hall C212
Office Hours:	MTWR: 12:00 pm - 1:30 pm | F:10:30 am- 12:00pm | By appointment
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Phone:	315-792-7379

Text and References

Artificial Intelligence : A Modern Approach S. Russell and P. Norvig (Pearson, 3rd edition)

Prerequisites

It is important that you have a foundation on both the theoretical and empirical fronts. You should have taken classes (or their equivalents) in : **Programming, Discrete Mathematics and Probabilities**.

Course Description

Web search, speech recognition, face recognition, machine translation, machine learning, autonomous driving, and automatic scheduling are all complex real-world problems. The goal of artificial intelligence is to solve some real-world problems with rigorous mathematical tools. To achieve the goal, it is important to understand the foundational principles that drive these applications and practice implementing (or using) some of these systems, such as IBM Watson. Specific topics include machine learning, search, game playing, Markov decision processes, constraint satisfaction, graphical models, and logic. The main goal of the course is to equip you with the tools to tackle new artificial intelligence problems you might encounter in life.

Course Objectives

- Familiarize students with the basic concepts associated with the filed of artificial intelligence

- Introduce specific problem areas of study within artificial intelligence

- Explore approaches used in research in this field

- Examine applications of artificial intelligence

Course Outcomes

- Identify and describe basic concepts associated with the field of artificial intelligence

- Develop simple solutions for problems related to artificial intelligence

- Critically analyze research in the field

- Compare and contrast various applications of artificial intelligence to real-world problems

- Apply and (or) modify software that is designed to solve real-world problems, such as speech recognition, machine learning and machine translation

- Pursue specialized studies in artificial intelligence

Topics

- Introduction

- Machine Learning

    - Linear Classification
    - Neural Networks
    - Unsupervised Learning

- Search

    - Tree Search
    - Dynamic Programming
    - A* and Heuristics

- Markov Decision Process

    - Reinforcement Learning
    - Monte Carlo
    - Function Approximation
    - N-Gram Modeling in Natural Language Processing (NLP)

- Game Playing & Constraint Satisfaction Problems

    - Minimax
    - Alpha-beta Pruning
    - Backtracking Search
    - 3-SAT Problem
    - Variable Elimination

- Bayesian Networks

    - Bayesian Inference
    - Hidden Markov Model (HMM)
    - Learning Bayesian Networks
    - Expectation Maximization

- Logic

    - Syntax versus Semantics
    - First Order Logic

- Markov Logic
- NLP: Semantic Parsing

- If time allows, we will explore topics such as Deep Learning.

Grading (Tentative)
The lecture format will be the basic mechanism used in the course. Computer demonstrations in the classroom will be used whenever appropriate. Assessment of student performance will use a criterion-referenced model which will include written assignments (25%), a midterm examination and a comprehensive final examination (25% each) and a project (25%).

Homeworks are with both written and programming parts. Each homework is centered around deepening your understanding of the theoretical concepts. Students are welcome to study together to work out homework solutions but the solution must be written **individually**.

The examinations will test your knowledge and problem-solving skills on all preceding lectures and homeworks. The final project provides an opportunity for you to use the tools from class to build something interesting of your choice. Projects should be done in groups of up to three. We will specify the details of the project proposal, project progress report and project final report during the semester.

Late assignment and report will not be accepted unless you have made prior arrangements with me. The acceptable format of your solution will be specified in the assignment. All examinations are closed-book. A typical grading scale will be as follows:

Percent	Grade
93 - 100	A
90 - 92	A-
87 - 89	B+
83 - 86	B
80 - 82	B-
77 - 79	C+
73 - 76	C
70 - 72	C-
65 - 69	D+
60 - 64	D
Below 60	F

Attendance Policy
Attendance and active class participation are required. Be prepared to participate by asking and answering questions during class meetings. Please send me an email if you know you have to miss a class.

Academic Integrity/Policy
Plagiarism and Cheating of any kind on an examination, quiz, or assignment will result at **least in an F** for that assignment (and may, depending on the severity of the case, lead to an F for the entire course). I will assume for this course that you will adhere to the academic creed of this University and will maintain the highest standards of academic integrity. In other words, **do not** cheat by giving answers to others or taking them from anyone else. The code of academic conduct is detailed in the SUNY Poly student handbook. Make-ups are only given under **extreme circumstances**. I will also adhere to the highest standards of academic integrity, so please do not ask me to change (or expect me to change) your grade illegitimately or to bend or break rules for one person that will not apply to everyone.

Accommodations for Students with Disabilities registered at SUNY Polytechnic Institute
In compliance with the Americans with Disabilities Act of 1990 and with Section 504 of the Rehabilitation Act, SUNY Polytechnic Institute is committed to ensuring educational access and accommodations for all its registered students seeking access to meet course requirements and fully participate in programs or activities. SUNY Poly students with documented disabilities and medical conditions are encouraged to request these services by registering with the Disability Services Office and discussing your need for accommodations. For information or an appointment contact Suzanne Sprague at the Disability Services Office, located in room B101 Kunsela Hall or by phone (315) 792-7170; or e-mail **suzanne.sprague@sunyit.edu**.