

## CSCI-360 Introduction to Artificial Intelligence (Section 30304R) – Spring 2017 Syllabus and Schedule

Classes: Wednesday, Friday, 5:00-6:50PM, Room SLH 102

Office Hours: (see <http://www.isi.edu/robots/CS360>)

Text Books: Artificial Intelligence: A Modern Approach (AIMA)

Reading Option: Autonomous Learning from the Environment (ALFE)

Week	Date	Topic	Reading	Homework	Project
1	Jan 11 Jan 13	Welcome! Introduction and history of AI, Intelligent agents, systems, and robots. Class structures, lectures, readings, homework, projects, exams, grades	AIMA1 AIMA2 (ALFE-1)		Project-1 out: Robot moves!
2	Jan 18 Jan 20	Problem Solving, Search, and Optimization Problems Representations, goals, and various search algorithms Description of three projects. Project 1 handout	AIMA3 AIMA4 (ALFE-2,6)	HW1, Encode State Space	
3	Jan 25 Jan 27	Game Playing and Constrain Satisfaction Representations and algorithms	AIMA5 AIMA6	HW2: Search	
4	Feb 1 Feb 3	Logical Representations and Reasoning Propositional logic and inferences First-order logic concepts and representation	AIMA7 AIMA8 AIMA9	HW3: Logic	Project-1 due
5	Feb 8 Feb 10	First-Order Logic Inferences Intelligent Actions, Planning, and Scheduling (option) General model of robotics, description and handout for Project 2	AIMA10 AIMA11 (ALFE-3, 6.1)	HW4: Planning	Project-2 out: Robot search!
6	Feb 15 Feb 17	Knowledge representations and model representations Logics and probabilities. Knowledge bases, Expert systems, Action models.	AIMA 12 (ALFE-4)	HW5: Game playing	
7	Feb 22 Feb 24	Uncertain Knowledge and Reasoning Uncertainty, Probabilistic Representation & Reasoning, <b>Bayesian Networks</b>	AIMA13-14 (ALFE-4)	HW6: Probability	
8	Mar 1 Mar 3	Probabilistic Reasoning over time: Temporal models, <b>Hidden Markov Models</b> , Kalman filters, Dynamic Bayesian Networks, Automata theory <b>Review for midterm exam</b>	AIMA15 (ALFE-5.10)	HW7: BN HMM, FSA	
9	Mar 8 Mar 10	<b>Midterm Close-book Exam (all materials above) – in class</b> Utility Theories, functions, decision networks Sequential decision making, Policies, <b>MDP, PO-MDP</b> , Multiagent decisions	AIMA 16-17 (ALFE 5)	HW8: POMOP	Project-2 due
10	Mar 15 Mar 17	<b>Spring Break (no class)</b>			
11	Mar 22 Mar 24	<b>Attribute-Based Learning:</b> Forms of learning, Model selection, Supervised Learning of <b>Decision Trees</b> , PAC learning, Decision Lists, Supervised learning: <b>Neural Networks</b> , Support Vector Machines, Ensemble and boost	AIMA18 (ALFE 4.1-5)	HW9: DT, NN, SVMs	Project-3 out: Robot learns!
12	Mar 29 Mar 31	<b>Relation-Based Learning:</b> Motivations, challenges, and algorithms. Inductive logic programming, Complementary Discrimination Learning	AIMA 19 (ALFE4.6-10)	HW10: NN, CDL	
13	Apr 5 Apr 7	<b>Probability-Based Learning:</b> Probabilistic Models, Naïve Bayes Models, EM algorithm, Reinforcement Learning	AIMA 20-21 (ALFE-5.10)	HW11: RF, NBM, EM	
14	Apr 12 Apr 14	<b>Surprise-Based Learning</b> Integrated Perception, Action, Problem Solving, and Learning. The challenge of vision and object/people/activity recognition, and robotic applications.	AIMA 24 (ALFE-7-12)	HW12: SBL	
15	Apr 19 Apr 21	Introduction to Robotics, Communication (Natural Language Processing), Collaboration, Self-organization, and Self-reconfiguration	AIMA22-23 Handout		
16	Apr 26 Apr 28	Future intelligent systems - The challenge of robots: with what we have learned, what hard problems remain to be solved? Different types of robots. Tasks that robots are for. Parts of robots. Architectures. Configuration spaces. Navigation, motion planning, locomotion, manipulation, and reconfiguration.	AIMA 25 LAFE-13 Handout		Project3 due
17	May 3	<b>TIME: Final Close-book Exam (materials of entire semester) – in class</b>			Final Exam

Project 1: Design and implement a simple robot Rx to move from point A to point B in an open environment.

Project 2: Give Rx intelligence so that it can search and navigate a path from point A to point B in a crowded environment.

Project 3: Make Rx learn from its own experience so that it can find a target in its environment.

Grade Structure: Midterm: 30%, Final: 30%, Project-1: 5%, Project-2: 10%, Project-3: 15%, Homework: 10%.

Late Project Penalty: -30% of the project grade for each day that is late.