

ICS 461 : Artificial Intelligence (3 cr.)			
Description	Survey of artificial intelligence: natural language processing, vision & robotics, expert systems. Emphasis on fundamental concepts: search, planning & problem solving, logic, knowledge representation.		
Prerequisites	311 .		
Learning Objectives	<ul style="list-style-type: none"> ● understand basic concepts of AI including search, planning & problem solving, logic, knowledge representation. ● appreciate the problems, current limitations and future potential of AI ● be able to recognize when AI techniques might be successfully applied to a programming problem and when the problem is beyond current the current state-of-the-art in AI ● have successfully programmed several small AI algorithms in Java ● have improved research and writing skills through practice and feedback (following Writing-Intensive guidelines) 		
Topic List	#	Topic	Lecture Hours
	1	Introduction: philosophy of intelligence, early history, the Turing Test, the Chinese Room Problem, Eliza, potential for AI	1.0
	2	Search and Game Playing: depth-first, breadth-first, hill-climbing, best-first, A*, minimax, alpha-beta pruning	3.0
	3	GPS: means-ends analysis, backtracking, recursive state spaces	2.0
	4	Logic: predicate logic, deduction, induction, abduction, resolution theorem proving	2.0
	5	Knowledge Representation: frames, Conceptual Dependency, semantic networks	5.0
	6	Vision: tessellations, edge detection, Waltz algorithm, gradient space, image intensities, 2D/2D sketch	3.0
	7	Robotics: kinematics, statics, dynamics, feedback, velocity-space diagrams	2.0
	8	Planning: hierarchical abstraction spaces, least commitment, plan critics, examples including STRIPS, ABSTRIPS, NOAH	3.0
	9	Computational Linguistics	1.0
	10	Parsing: augmented transition networks, ambiguity, semantics, phrasal analysis	3.0
	11	Machine Translation	1.0
	12	Text Understanding: using scripts and plans for story interpretation	2.0
	13	Agent Modeling and Agents	2.0
	14	NL Systems: examples of large scale natural language systems including HEARSAY-II, GUS, HAM-ANS, UC, Q&A	3.0

15	Uncertainty and Bayes Nets	2.0
16	Expert Systems: forward/backward chaining, Fuzzy Logic, ES tools, ES explanation, examples including MYCIN, PROSPECTOR, XCON, DENDRAL, MACSYMA	3.0
17	Machine Learning and Neural Networks	2.0