

COURSE DESCRIPTION

Department and Course Number: CSCI 531

Course Title: Artificial Intelligence

Current Catalog Description: Use of the computer in human problem-solving. Game theory, decision trees, Markov decision problems, selected topics.

Total Credits: 3 hours

Coordinator: Dawn Wilkins, Associate Professor of Computer and Information Science

Textbook: Russell and Norvig. *Artificial Intelligence: A Modern Approach*.

Other required materials: None

References: <http://www.cs.olemiss.edu/~dwilkins/CSCI531/>

Course Goals: Upon completion of this course, students will be able to understand and implement components of artificial intelligence (AI) systems, and will be able to discuss suitable algorithms and knowledge representation schemes for AI systems.

Prerequisites by Topic: Programming, data structures, algorithms (suggested).

Major Topics Covered in the Course:

1. Introduction to Artificial Intelligence (AI)
2. History of AI
3. Architecture of intelligent agents
4. Simple search strategies (BFS, DFS, depth-limited, etc.)
5. Informed search strategies (best first, A*, hill-climbing, simulated annealing, etc.)
6. Game playing, including minimax, alpha-beta pruning, heuristics, games with chance
7. Knowledge-based agents and representations
8. Reasoning and Inference using propositional logic, FOL, forward and backward chaining, resolution
9. Logical reasoning systems, Prolog, theorem provers, frame systems and semantic networks
10. Planning, representations and partial-order planning
11. Philosophical foundations
12. AI and the future

Laboratory projects: Generally there are 2-3 projects for the course. One project generally involves simple searching, for example coding of the Missionaries and Cannibals problem. Another project generally involves a game with an informed search such as A*. Sometimes students are required to implement alpha-beta pruning, and sometimes students are asked to implement multiple heuristics and empirically compare them. The third project is a knowledge-based situation requiring reasoning and not just search. A common programming problem is a simplified Wumpus World situation. Each project is expected to be completed in 2-3 weeks.

Estimate of ABET/CAC Category Content:

	CORE	ADVANCED		CORE	ADVANCED
Data Structures	_____	_____ 1 _____	Computer Organization and Architecture	_____	_____
Algorithms	_____	_____ 1 _____	Concepts of Programming Languages	_____	_____ 1 _____
Software Design	_____	_____		_____	_____

Oral and Written Communications

Not a significant focus of this course.

Social and Ethical Issues

A class period or two is generally devoted to social and ethical issues related to artificial intelligence during the section on AI and the future. The topic is handled through class discussion and participation.

Theoretical Content (Foundations)

Theoretical issues, including the complexity of search algorithms, inference, and heuristics to avoid NP-hard problems are integrated throughout the course. While not the focus of the course, it gives the students an opportunity to see applications and why they need to study theory.

Problem Analysis and Solution Design

The programming assignments for this course are non-trivial. Normally a couple of class periods (or extra study session) involve whole-class discussion to analyze similar or related problems and comparison of the trade-offs with respect to various implementation choices.