

CS 4200 : ARTIFICIAL INTELLIGENCE METHODS

Semester Hours: 3.0 *Contact Hours:* 3

Coordinator: Qing Tian

Text: Artificial Intelligence: A Modern Approach

Author(s): RUSSELL AND NORVIG

Year: 2010

SPECIFIC COURSE INFORMATION

Catalog Description:

Intermediate AI programming with application to representative problems requiring searching, reasoning, planning, matching, deciding, parsing, seeing and learning. Prerequisite: CS 3350.

Course type: **ELECTIVE**

SPECIFIC COURSE GOALS

- I can explain the major challenges facing AI, both from a theoretical (research) and a practical (application) standpoint.
- I understand the properties of AI task environments well enough to give a correct PEAS (Performance, Environment, Actuators, Sensors) description of a specific task environment.
- For simple AI problems, I can formulate a correct abstract model consisting of states, actions, transitions, goals and costs.
- I can explain and implement basic AI search algorithms, including blind searches (depth-first, breadth-first) and informed searches (best-first and A*).
- I can describe and compare Hill-climbing search, simulated annealing, local beam, search and genetic algorithms.
- I can explain and implement, in script or pseudocode, the minimax algorithm and the alpha-beta pruning algorithm.
- I can describe and explain some agent-based AL architecture (e.g., game-playing agents).
- I can explain how propositional theorem-proving works.
- I understand the concepts of first-order predicate logic (FOPL) well enough to explain how forward- and backward-chaining algorithms work.

LIST OF TOPICS COVERED

- Introduction to AI
- Problem Solving and Search
 - State Space
 - Blind Search, Heuristic Search (including A*), Adversary Search
- Knowledge Representation Tools
 - Logic
 - Semantic Nets, Frames
 - Probability
 - Fuzzy Logic
 - One or more of the following optional topics: transition nets (including ATNs), inductive logic, non-monotonic logic, neural nets
- Integrated AI Systems
 - Planning Systems
 - Rule-based Expert Systems
 - Constraint Propagation Systems
 - Truth Maintenance Systems
 - Learning Systems
 - One or more of the following optional topics: robotic systems, vision systems, natural language systems, neural network systems, connectionist systems, theorem-proving systems.
- Evaluation and Overview
 - Ethical Issues in AI
 - What Computers Can Do
 - What Computers Still Can't Do