COURSE DESCRIPTION

Department and Course Number CMPS 420 **Course Coordinator** Mark G. Radle

Course Title Artificial Intelligence **Total Credits** 3

URL www.cacs.louisiana.edu/~mgr/420 **Semester hours** 3

Current Bulletin Description

Theories and techniques. The background and foundations of AI, intelligent agent-based representation, problem solving and search algorithms, game playing, introduction to LISP, knowledge representation and knowledge-based systems. Introduction to other sub-areas such as: natural language processing, connectionist models and evolutionary algorithms. Fa. Prereq: CMPS 341, 351 both with a minimum grade of C; or CMPS 405 with a minimum grade of B.

Textbook

George F. Luger, *"Artificial Intelligence: Structures and Strategies for Complex Problem Solving"*, Fifth Edition, Addison Wesley, 2005

References

None

Course Goals

The course will introduce the student to the principals of Artificial Intelligence and the basic concepts of problem solving techniques and knowledge representation. It will introduce the students to the major areas of applications of AI e.g. Representation and search, knowledge based systems, machine learning and natural language processing.

Course Outcomes

Prerequisites by Topic

Major Topics Covered in the Course

1. Foundations and Background of AI
2. Predicate Calculus
   - Propositional calculus
   -Predicate calculus
   -Inference rules
3. State Space Search
   -DFA/NFA
   -Data-driven and goal-driven search
   -Breadth and depth first searches
   Iterative deepening
4. Heuristic Search
   -Hill climbing
   -Best first search
   -Heuristic evaluation functions
   -Algorithm-A, admissibility, algorithm-A*
   -Alpha-Beta pruning
5. Stochastic Methods
   -Probability theory
   -Conditional probability
   -Probabilistic finite state acceptors

6. Knowledge Representation
    -Semantic networks
    -Conceptual dependency theory
    -Scripts
    -Frames
    -Conceptual graphs
7. Expert Systems
    -Rule based systems
    -Goal and data driven reasoning
    -Case based systems
    -Planning
8. Machine Learning
    -Version space search
    -Candidate elimination algorithm
    -Decision tree induction
    -Inductive bias
    -Conceptual clustering
    -Reinforcement learning
9. Connectionist Systems
    -Perceptron learning
    -Backpropagation algorithm
10. Social and Emergent Learning
    -Genetic Algorithm
    -Classifier systems
    -Artificial life – cellular automaton
    -Evolutionary programming
11. AI Programming Languages
    -ML
    -Prolog

Laboratory projects (specify number of weeks on each)

- Implementation of algorithm-A* for the 8-puzzle problem. (3 weeks)
- Implementation of a planning system for the blocks world. (3 weeks)
- Implementation of a genetic algorithm. (4 weeks)

B. Oral and Written Communications

Every student is required to submit at least __0___ written reports (not including exams, tests, quizzes, or commented programs) of typically __0___ pages and to make __0___ oral presentations of typically __0___ minutes duration. Include only material that is graded for grammar, spelling, style, and so forth, as well as for technical content, completeness, and accuracy.

C. Social and Ethical Issues

Please list the topics that address the social and ethical implications of computing covered in all course sections. Estimate the class time spent on each topic. In what ways are the students in this course graded on their understanding of these topics (e.g., test questions, essays, oral presentations, and so forth)?

NA

Theoretical Content

Please list the types of theoretical material covered, and estimate the time devoted to such coverage.

NA

Problem Analysis

Please describe the analysis experiences common to all course sections.

NA

Solution Design

Please describe the design experiences common to all course sections.

NA