CSCE 580: ARTIFICIAL INTELLIGENCE

Catalog Course Description:
580—Artificial Intelligence. (3) (Prereq: CSCE 350) Heuristic problem solving, theorem-proving techniques, and knowledge representation, including the use of appropriate programming languages and tools.

Prerequisites by Topic:
Programming skills
Data structures and algorithms

Textbook and Other Required Material:
Stuart Russell and Peter Norvig, *Artificial Intelligence: A Modern Approach*, 2nd edition, Prentice Hall, Englewood Cliffs, NJ, 2003.

Sandia National Laboratories, *Jess: The Rule Engine for Java.* *http://herzberg.ca.sandia.gov/jess/*. First posted 1997, Modified 2005.

Computing Platform: Windows XP, LISP, Jess

Course Objectives: {Assessment Methods Shown in Braces}
1. Analyze and understand software agents {homework, project}
2. Use the LISP programming language, especially for recursive functions {tests, homework, project};
3. Converting net search to tree search {tests, homework};
4. Perform depth-first, breadth-first, and hill climbing search from a starting node to a goal node {tests, homework};
5. Determine optimal search paths using the A* search algorithm {tests, homework, project};
6. Represent knowledge in predicate calculus form {tests, homework};
7. Use resolution for theorem proving {tests, homework};
8. Represent knowledge in rule form and use the CLIPS/JESS rule-based system {homework, project}.

Topics Covered:
1. Intelligent agents (3)
2. Logical agents (2)
3. First-order logic (6)
4. Inference in first-order logic (3)
5. Knowledge representation (4)
6. Solving problems by searching (4)
7. Informed search (4)
8. Adversarial search (3)
9. Constraint satisfaction (3)
10. Uncertain knowledge and reasoning (3)
11. Review and examinations (4)

Laboratory Projects and Other Student Work:
Students complete a major project involving implementation on an artificial intelligence system in addition to homework assignments and examinations.

Difference between Undergraduate and Graduate Work:
Students enrolled for graduate credit are required to complete a more demanding project and are evaluated on a more rigorous grading scale than undergraduate students to justify the receipt of graduate credit for this course.

Syllabus Flexibility: High. The instructor selects the text and topics.

Relationship of Course to Program Outcomes:
The contribution of each course objective to meeting the program outcomes is indicated with the following scale: 3 = major contributor, 2 = moderate contributor, 1 = minor contributor. Blank if not related.

	Program Outcomes										
Course Objectives	1. Logic & Math	2. Computing Fundamentals	3. Apply Computing Principles	4. Work on teams	5. Communicate Effectively	6. Liberal arts & Soc. Sciences	7. Basic Science and Lab Procedures	8. Learn New Tools & Processes	9. Employed upon Graduation	10. Application Area	11. Electronics and Digital Sys Design
1. Software agents			3						2		
2. Use LISP			3						1		
3. Net search and tree search		2	3						1		
4. Depth-first, breadth-first, and hill climbing searches		2	3						2		
5. Optimal search		3									
6. Knowledge representation using predicate calculus		2						2			
7. Resolution theorem proving	3										
8. Rule-based knowledge representation (CLIPS/JESS)			3								

Estimated Computing Category Content (Semester hours):

Area	Core	Advanced	Area	Core	Advanced
Algorithms		1	Data Structures		1
Software Design		0.5	Programming Languages		0.5
Computer Architecture					

Estimated Information Systems Category Content (Semester hours):

Area	Core	Advanced	Area	Core	Advanced
Hardware and Software		1	Networking and Telecommunications		
Modern Programming Language			Analysis and Design		1
Data Management			Role of IS in an Organization		
Quantitative Analysis		1	Information Systems Environment		

Oral and Written Communication:
Oral presentation and written report on project

Social and Ethical Issues: None

Theoretical Content:
Logic, inferencing, analysis of algorithms

Analysis and Design:
Design and implementation of project

Class/Laboratory Schedule:
Lecture: 3 periods of 50 minutes or 2 periods of 75 minutes per week

Course Coordinator: Larry Stephens

Modification and Approval History:
Initial description April 1999
Revised March 2001
Revised July 2002 to include statement on graduate work
Revised June 2005 by Caroline Eastman using course materials from Larry Stephens to update text to a newer edition and modify list of topics