

**Course Number:** CIS 290

**Course Title:** Advanced Topics in CIS: Artificial Intelligence

**Number of Unites:** 4

**Schedule:** Three hours of lecture and one hour of discussion per week.

**Prerequisites:** CIS 260, CIS 230, and CIS 160

### **Catalog Description :**

Includes an introduction to artificial intelligence as well as current trends and characterization of knowledge-based systems. Search, knowledge representation schemes, production systems, and expert systems will be examined. Additional areas include knowledge discovery and neural learning.

### **Expanded Description:**

- Scope of AI: Games, theorem proving, natural language processing, vision, expert systems, AI techniques-search knowledge.
- Problem Solving: State space search; Production systems, search space control: depth-first, breadth-first search, heuristic searches: Hill climbing, best-first search, branch and bound, Problem Reduction, Constraint Satisfaction End, Means-End Analysis.
- Knowledge Representation: Predicate Logic: Unification, modus ponens, resolution, and dependency directed backtracking.
- Rule based Systems: Forward reasoning: Conflict resolution, backward reasoning: use of no backtrack.
- Expert Systems: Need and justification for expert systems, knowledge acquisition, Case studies.
- Structured Knowledge Representation: Semantic Nets, slots, default frames, conceptual dependency, and scripts.
- Handling uncertainty: Non-Monotonic Reasoning, Probabilistic reasoning, and use of certainty factors.
- Learning: Concept of learning, learning automation, genetic algorithm, learning by inductions, neural nets.
- Knowledge discovery in database.

### **Course Objectives & Role in the Program:**

The objective of the course is to present an overview of artificial intelligence (AI) principles and approaches. Develop a basic understanding of the building blocks of AI as presented in terms of intelligent agents: Search, Knowledge representation, inference, logic, and learning. Students will implement a small AI system in a team environment. The knowledge of artificial intelligence plays a considerable role in some applications students develop for courses in the program.

### **Learning Outcomes:**

Upon successful completion of this course student will:

- be able to design a knowledge based system,
- be familiar with terminology used in this topical area,

- have read and analyzed important historical and current trends addressing artificial intelligence,

### **Method of Evaluation**

- Project participation and contribution (*will be graded on individual basis and will include forum participation, source code, architecture, documentations contributions and presentation*) - 20%
- Home Assignments – 15%
- Final Exam (*3 hours – Open book*)– 30%
- Midterm Exam (*2 hours – Open book*) – 20%
- Class participation (*including outside reading presentations, quizzes and active learning*) – 15%

### **Required Books:**

#### Textbooks:

1. *Artificial Intelligence: Structures and Strategies for Complex Problem Solving*, George Luger; Benjamin Cummings, 2004.
2. *Introduction to Artificial Intelligence*, Rajendra Akerkar; Prentice Hall of India, 2005.

#### Reference:

1. *Artificial Intelligence: A Modern Approach* (2<sup>nd</sup> edition), Russell & Norvig; Prentice Hall. 2003
2. *Introduction to AI and Expert Systems*, D. W. Patterson; PHI, 1992.
3. Other course material will be provided during the course.

**Modified by:** R. Akerkar

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