CSC 340  Artificial Intelligence  3 cr.

Catalog description:
This course studies the theory and application techniques which allow a computer to "behave intelligently". Various operational definitions of intelligence are discussed, along with the concept of "mechanized intelligence". The course includes case studies of expert systems which solve engineering design problems, diagnose disease, and learn from their environment via natural language and/or visual interaction with a user. The role of planning, goal formation, search analysis and evaluation, and various forms of representation will be discussed extensively. Three lecture hours per week.

Prerequisite: CSC 260; PHL 325 also recommended.

Goals:
This course is intended to introduce the basic concepts of artificial intelligence. The student will employ hands-on case studies to internalize the techniques of AI. The course will develop an understanding of:
- CO01: the concepts of the fundamental branches of artificial intelligence;
- CG02: the basic approaches to problem-solving using AI techniques;
- CG03: machine learning through induction, deduction, and reference;
- CG04: Q-based and reinforcement learning.

Objectives:
Upon successful completion of this course the student will have
- CO01: explained the rudimentary concepts of artificial intelligence techniques;
- CO02: based on stated problem constraints, selected an artificial intelligence method of solution;
- CO03: diagramed the learning methods of AI;
- CO04: demonstrated through a project the simple method of Q-based learning.

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Topics:
- functional definitions of intelligence
  - basic data representation and storage techniques
  - defining bounds on a problem
  - constraint propagation
- search techniques
  - finding a path
  - locating best path
  - adversarial approach to search
- general control paradigms using GPS as a starting point
- problem solving approaches
  - generate and test
  - rule based systems
- knowledge representation
  - review of basic techniques
  - inheritance
  - abstraction to summary units
  - frames
  - expansion to fundamental units
- learning
  - matching
  - rules and rule-like paradigms
- learning by example

IS1(5), IS2(3), IS4(3), IS3(6), IS5(6) (not core), IS6(1), IS8(6) (not core)
application of preceding concepts (coverage dependent on time available) IS7(1), IS9(3),IS10(6) (nc)
° language understanding
° vision analysis
° medical diagnosis
° mathematical theorem proving

The emphasis of this course in on the understanding of the basic approaches to knowledge acquisition, representation and retrieval with respect to the general concept of simulating intelligent behavior. Various techniques for representing knowledge and rules are presented and discussed with emphasis on generalized problem-solving paradigms. Specific examples of AI and AI-related systems are included as a means of solidifying theoretical concepts. Given the emphasis of the course and the breadth of the topic areas, little or no programming is included. (The course CSC 410 often provides an applications oriented treatment of AI topics.)

The course grade will be determined using the following approximate weights: final exam: 30%, other tests, written homework, and projects: 70%.

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Bibliography:


Nilsson. **Artificial Intelligence.** Kaufmann

Patterson, Dan W. **Introduction to Artificial Intelligence & Expert Systems.** Prentice Hall, 1990.

