

CS 382 Artificial Intelligence

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Description

382 ARTIFICIAL INTELLIGENCE (3+0) 3 credits

Problem solving, search, and game trees. Knowledge representation, inference, and rule-based systems. Semantic networks, frames, and planning. Introduction to machine learning, neural-nets, and genetic algorithms. Prerequisite: CS 308.

This course introduces Artificial Intelligence (AI). Starting with a definition of AI, I will teach the basic knowledge representation, problem solving, and learning methods used in AI. In addition to the material taught in the course (and textbook) you will be expected to read papers that I provide, as well as go out and find relevant resources (papers, code, systems) in order to complete a final project. In computer science and engineering, especially in AI, you must develop the ability to learn on your own. You will be using systems and code developed by others to complete your assignments and project. This should engender a critical appreciation of good design and recognition of both good and bad design. The next few sections provide administrative details, course objectives and expected outcomes, the syllabus, and grading information.

Office Hours

- **Sushil:**
 - T 9:30 - 11:30
 - And by appointment (email sushil@cs.unr.edu for an appointment)

TextBook

- **Required:** Patrick H. Winston, *Artificial Intelligence*, 3rd Edition, Addison-Wesley.

Objectives and Outcomes

Subject Objectives

A student completing cs382 will be able to:

1. Explain the basic knowledge representation, problem solving, and learning methods of Artificial Intelligence.

2. Assess the applicability, strengths, and weaknesses of the basic knowledge representation, problem solving, and learning methods in solving particular problems.
 3. Develop intelligent systems by assembling solutions to concrete computational problems.
 4. Appreciate the role of problem solving, learning, and perception in understanding human intelligence from a computational perspective.
- and many cs382 students will:
5. Develop an interest in the field sufficient to take more advanced subjects.

Preliminary Syllabus

1. Introduction
 - (a) What can a computer do and what can't it do?
 - (b) What is AI?
 - (c) Why Study AI?
2. Approaches (Representations and problem solving approaches)
 - (a) State spaces (representation)
 - i. Generate and test, Means-end analysis
 - ii. Problem Reduction, Algorithms for finding paths in a graph
 - iii. Tree Search, DFS, BFS, NDS, Heuristic Search
 - iv. Hill Climbing, Beam Search
 - v. Minimax Search, Alpha-Beta pruning
 - (b) Rule-based Systems, Knowledge acquisition,
 - (c) Frames and Inheritance
 - (d) Logic, Reasoning, and Proof by Refutation
3. Machine Learning
 - Decision Trees
 - Neural approaches
 - Evolutionary approaches
4. Evolutionary Approaches
 - (a) Genetic Algorithms/Simulated Annealing
 - (b) Genetic Programming
5. Other topics as time and class interest dictate

Grading, Homework, and Exams

Students will be assigned letter grades using the +/- system. Your grade will be one of A, A-, B+, B, B-, C+, C, C-, D, or F.

There will be a number of programming assignments. No late assignments will be accepted. Use whatever programming language you like, although I'll talk about LISP early on in the semester and you will need it for one assignment. There will be two exams and a final project. Some projects can be done in groups. The first exam will be held about 1/3 through the course, the second about 2/3 through the course. The grades will be divided as shown in the table below. Assignments will be posted on the class web pages.

Two exams (10% each) and a final (20%)	40%
Five assignments (8% each)	40%
Group or Individual Project	20%

Communications

If I need to communicate with the class as group I'll post a message on our web page. You are required to check the class web page and your email every day. I will use your computer science and engineering email address. If you do not have a CS department account, go the CS department office and fill out the account request form. If you do not know how to forward your email, **ask**. As an aside - this is a good strategy for learning: If you do not know how to *X*, ask. Ask me, our grader, your friends, the person sitting next to you, By the same token, take pity on and help out people who ask you. Learning is a cooperative experience.

In addition to the textbook, there are number of resources available. Our class notes will be available on the WWW from

<http://www.cs.unr.edu/~sushil/class/ai>

(follow the Artificial Intelligence Link). I will also point out various other places that contain material of interest to us.

Cheating

Cheating is not permitted and will result immediately in a grade of "F." and commencement of administrative proceedings. Please read the section on **Academic Standards** at

<http://www.unr.edu/stsv/acdispol.html>.

That page defines cheating and specifies the consequences.

Disability Statement

If you have a disability and will be requiring assistance, please contact me or the Disability Resource Center (Thompson Building Suite 101) as soon as possible to arrange for appropriate accommodations.