Course Description
This course will introduce the basic principles in artificial intelligence research. It will cover simple representation schemes, problem solving paradigms, constraint propagation, and search strategies. Areas of application such as knowledge representation, natural language processing, expert systems, vision and robotics will be explored. The LISP programming language will also be introduced.

Prerequisites
CS 220

Learning Outcomes
• To have an appreciation for and understanding of both the achievements of AI and the theory underlying those achievements.
• To have an appreciation for the engineering issues underlying the design of AI systems.
• To have a basic proficiency in an traditionally AI language including an ability to write simple to intermediate programs and an ability to understand code written in that language.
• To have an understanding of the basic issues of knowledge representation and blind and heuristic search, as well as an understanding of other topics such as minimax, resolution, etc. that play an important role in AI programs.
• To have an basic understanding of some of the more advanced topics of AI such as learning, natural language processing, agents and robotics, expert systems, and planning.

Required Text
Artificial Intelligence, 6th edition, by George Luger, Addison Wesley Publisher.

Optional Text
LISPer craft by Robert Wilensky, W.W. Norton.

Software

Exams:
Test 1 Tuesday February 24
Test 2 Thursday March 26
Test 3 Tuesday May 5

The 2008-2009 academic calendar is available at: http://www.hartford.edu/newsevents/calendar/academic.asp
Grading:
Test 1  15%
Test 2  15%
Test 3  15%
Project 30%
Assignments 15%
Presentation 10%

Introductory Readings
What is AI? (by John McCarthy)
History and Promise of AI (by David Waltz)
The Human Intelligence Enterprise. Why I am Optimist (by Patrick Winston)

Other Readings
Machine Learning and Data Mining, by Tom Mitchell, Communications of the ACM
Does Machine Learning Really Work? By Tom Mitchell, AI Magazine

AI Resources
AAAI AI resources
CMU AI Repository
Guy Steele's Common Lisp the Language, 2nd Edition
AI Programming Resources
Lisp Quick Reference

Readings from Wilensky

Introduction to Lisp Chapters 1-8 Getting Started, Symbolic Computation, Basic LISP primitives, Procedure Definition and Binding, Predicates/conditionals/Logical Operators, Recursion, Iteration, Procedure and Data Abstraction, Mapping.

Readings from Luger

Part I Artificial Intelligence: Its Roots and Scope

Chapter 1: AI: History and Applications
From Eden to ENIAC: Attitudes toward Intelligence, Knowledge, and Human Arftice, Overview of AI Application Areas, Artificial Intelligence--A Summary.

Part II Artificial Intelligence as Representation and Search

Chapter 2: The Predicate Calculus

Chapter 3: Structures and Strategies for State Space Search
Graph Theory, Strategies for State Space Search, Using the State Space to Represent Reasoning with the Predicate Calculus.

Chapter 4: Heuristic Search
Hill-Climbing and Dynamic Programming, the Best-First Search Algorithm, Admissibility, Monotonicity, and informedness, Using Heuristics in Games, Complexity Issues.
Chapter 5: Stochastic Methods
The Elements of Counting, Elements of Probability Theory, Applications of the Stochastic Method, Bayes’ Theorem

Chapter 6: Control and Implementation of State Space Search
Recursion-Based Search, Production Systems.

PART III Capturing Intelligence: The AI Challenge

Chapter 7: Knowledge Representation
Issues in Knowledge Representation, History of AI Representational Schemes, Conceptual Graphs: A Network Language, Alternatives to Explicit Representation, Agent-Based and Distributed Problem Solving

Chapter 8: Strong Method Problem Solving

Chapter 9: Reasoning in Uncertain Situations
Logic-Based Abductive Inference, Abduction: Alternatives to Logic

PART IV Machine Learning

Chapter 10: Machine Learning: Symbol-Based
A Framework for Symbol-Based Learning, Version Space Search, ID3 Decision Tree Induction Algorithm, Unsupervised Learning, Reinforcement Learning

Chapter 11 + Handouts: Machine Learning: Connectionist
Foundations for Connectionist Networks, Perceptron Learning, Backpropagation Learning, Competitive Learning.

Course Policies:
I strongly urge you to start working on a program as soon as it is assigned. You will find out that it will take longer than you think. You are expected to submit your own work. Plagiarism is presenting someone else’s work as your own. This includes software you find on the internet. You may discuss an assignment with students and certainly with me, but you are expected to submit your own work on all assignments. Any assignments that are copied will be given a grade of zero as well as the ones that were copied from. The students involved will be subject to further disciplinary action. The academic honesty policy is described in the student handbook, the Source, which is available online at http://www.hartford.edu/thesource.

I strongly encourage students with special needs, whether an athlete or a student with a documented learning disability, to let me know of their needs as soon as possible so I can accommodate them.

Assignments are due at the beginning of the class period and in hard copy. The penalty for late assignments is 10% from Tuesday to Thursday and 15% between Thursday and Tuesday. No assignment will be given a grade after one week. However, you are encouraged to complete and submit a late assignment even if it is past one week.

You are expected to attend every class. You should inform me of any absences prior to class.

You will have opportunities for in-class extra credits. You will not be able to take advantage of this if you are not in class.
Assignments and some course material will be posted on blackboard (blackboard.hartford.edu). You are not to rely completely on blackboard. Some material as well as some announcements will be given in class and not announced on blackboard. You are responsible for all material and announcements given in class.

Make-up exams are only given when there are documented extenuating circumstances and only if they are pre-arranged.

I have regular office hours which are posted on my web page. I urge you to make use of them as soon as you need help. Do not wait until it is too late. You do not need to schedule an appointment to see me during my office hours. Feel free to drop by anytime even to just say hello. You may also meet with me at other times by appointment.