COMP 3190
Artificial Intelligence
Fall 2008

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Lecture Times: M,W,F: 10:30 - 11:20, EITC E2 105
Prerequisites: C or better in Comp 2140 (or the former 74.214 or 74.206).

Introduction

This course introduces fundamental topics in the study of artificial intelligence. We will study the nature of intelligence and intelligent information processing, and examine basic principles of search and knowledge representation. We will then apply these principles to the study of problems in areas such as expert systems, natural language understanding, robotics and learning. The majority of the course will emphasize a symbolic approach to artificial intelligence, although the subsymbolic (Genetic Algorithms) approach will also be considered briefly.

A selection of topics that will be covered in lecture are:

- *Nature of Intelligence*: Intelligence and artifical intelligence, Symbols and symbol systems, problem solving and problem spaces.

- *Knowledge Representation*: First order logic, programming in prolog, rule-based and structured representations, frame problem.

- *Search*: Depth first, breadth first, iterative deepening, beam search, taboo search, A* search, heuristics.

- *Dealing with Uncertainty*: Reasoning with uncertainty, imprecise knowledge.

- *Applications of artificial intelligence*: Expert systems, natural language understanding, planning, agents, robotics.

- *Computer Vision*: Edge detection, region segmentation, Waltz algorithms.

- *Machine Learning*: Reinforcement learning, genetic algorithms.

- *Practical planning*: Hierarchical task network (HTN) planning. real-time planning.

Office Hours

I am available for student consultation during my regular office hours Monday from 11:30 - 12:30 or after prior appointment.

Grading

The course mark is determined by: (a) a final exam (60%), (b) a midterm test (20%), and (c) practical work (30% Assignments).

Assignments (30%)

Course assessment includes a large practical component. There are three assignments covering specific topics. Each assignment is worth 10%. The following list contains some sample assignment topics:

1. Implement a means-end analysis planner for the blocksworld.

2. Compare the performance of iterative deepening and A* in a path planning problem.

Midterm (20%)

There will be a midterm exam worth 20%. The midterm will be held in class.

Final Exam (50%)

There will be a final exam worth 50%. The exam will be three hours long. The final exam will be held during examination period at the end of the term. Exact time and location will be determined by Student Records.

Textbook

The textbook for this course is George Luger, *Artificial Intelligence: Structures and Strategies for Complex Problem Solving*, 6th Edition, Addison Wesley; 6 edition (March 7, 2008), ISBN-13: 978-0321545893.

The material in the textbook will be supplemented by additional material covering the state of the art in Artificial Intelligence research.

Students are expected to understand the material as well as being able to implement simple versions of the described techniques and algorithms.

Academic Dishonesty

The Faculty of Science and The University of Manitoba regard acts of academic dishonesty in quizzes, tests, examinations, laboratory reports or assignments as serious offences and may assess a variety of penalties depending on the nature of the offence. Acts of academic dishonesty include, but are not limited to bringing unauthorized materials into a test or exam, copying from another individual, using answers provided by tutors, plagiarism, and examination personation.

Cell phones, pagers, PDAs, MP3 units or electronic translators are explicitly listed as unauthorized materials, and must not be present during tests or examinations.

Penalties that may apply, as provided for under the University of Manitoba's Student Discipline By-Law, range from a grade of zero for the assignment or examination, failure in the course, to expulsion from the University. The Student Discipline By-Law may be accessed at:

http://umanitoba.ca/admin/governance/reddot/governing_documents/students/discipline/210.htm

Suggested minimum penalties assessed by the Faculty of Science for acts of academic dishonesty are available on the Faculty of Science web-page: http://umanitoba.ca/science/student/webdisciplinedocuments.html

A declaration sheet, which states that the work being submitted is completely your own, is available at http://www.cs.umanitoba.ca/newsite/honesty.html. This sheet must be printed out, filled in, signed, and attached to every assignment that is submitted. No assignment will be marked unless this declaration is attached.

Important Note to Students from the Faculty of Science

It is your responsibility to ensure that you are entitled to be registered in this course. This means that you:

- have the appropriate prerequisites, as noted in the calendar description, or have permission from the instructor to waive these prerequisites;

- have not previously taken, or are concurrently registered in, this course and another that has been identified as "not to be held with" in the course description. For example, BIOL 1000 cannot be held for credit with BIOL 1020.