CS 475 — Artificial Intelligence I

Fall 1999

Instructor:	Professor Janyce Wiebe SH 163; Telephone No. 646-6228; e-mail wiebe@cs.nmsu.edu; http://www.cs.nmsu.edu/ wiebe Office Hours: by appointment; TBA
Lectures:	TTh 8:55-10:10, SH113

Required Text: *Artificial Intelligence, a modern approach*
S. Russell & P. Norvig, Prentice Hall, 1995.

Optional: A book about Common Lisp, such as:
- *LISP*, 3rd edition, by P. Winston and B. Horn.
- *Common LISPcraft*, by R. Wilensky.
- *A Programmer's Guide to Common Lisp*, by D. Tatar.

Grading scheme:

Projects and Written Assignments	50%
Midterm	20%
Final	30%

Desired Prerequisites: CS 372, CS 272, & Math 279/330.
If you don't have them, please see me.

Important Dates:

Last day to withdraw with a W:	Wed, Oct 20
No class:	Mon, Sept 6
	Wed-Fri, Nov 24-26
Midterm	Tues, Oct 19
Final exam:	8:00-10:00, Thurs, Dec 16

Notes:

Late Penalty: 10% per day up to 5 days (**including** Sat and Sun).

Your own work: All work you hand in must be your own, unless explicitly stated otherwise on an assignment.

Course Withdrawals: If you decide to withdraw from the course, you are responsible for ensuring that all steps are taken to formally withdraw. Do not assume that you will be dropped automatically.

I Grades: The grade of I (incomplete) may be given only if you are unable to complete the course due to documented circumstances beyond your control that develop after the last day to withdraw from the course. Appropriate circumstances include illness and death or crisis in your immediate family. Consult the university catalog for regulations regarding an I grade. In no case will an I grade be assigned to avoid a grade of D or F in the course.

S/U Grades: If you elect to be graded under the S/U option, you must declare your intention when registering for the course. All work in the class will be graded in a manner identical to that for students choosing the letter grade option. At the end of the semester, your final letter grade in the course will be used to assign either an S or a U. In accordance with Faculty of Arts and Sciences regulations, you must achieve a minimum grade of C in order to receive a grade of S.

Miscellaneous: If you have, or think you have, a disability that interferes with your academic progress, you may contact Services for Students with Disabilities at 646-6840 for an appointment. Services for Students with Disabilities is located in Garcia Annex, Room 102. Current and appropriate documentation will be required in order to receive services.

If you have a condition which may affect your ability to exit safely from the premises in an emergency or which may cause an emergency during class, you are encouraged to discuss this in confidence with the instructor and/or the directory of Disabled Student Programs. If you have general questions about the Americans With Disabilities ACL (ADA), call 646-3333.

Planned Order of Topics

Readings in the text are listed below. Note that additional material will also be presented in class.

1. Part I: Introduction
   (a) Introduction to the course
   (b) Chapters 1 (History of AI) and 2 (Intro to intelligent agents) are better read on your own
   (c) What is AI?
   What are the problems and goals?

2. Part II: Problem Solving by Search (chapters 3 and 4)
   (a) General framework: state-space search
   (b) Brief review of depth-first and breadth-first search
   (c) Depth-limited and iterative-deepening search
   (d) Bi-directional search
   (e) Heuristic functions
   (f) Best-first search:
      i. Hill-climbing (greedy search)
      ii. A* search and variants: IDA* and SMA* search
   (g) You will also be exposed to Lisp in this section

3. Part III: Knowledge representation and reasoning (KRR)
   (a) Representation, reasoning, and logic in the context of Propositional logic (Chapter 6)
      i. The relationship between syntax and semantics
      ii. Entailment (logically follows; $\models$)
      iii. Inference procedures ($\vdash$)
      iv. Soundness and completeness
      v. Validity and Satisfiability
      vi. Monotonicity
   (b) Representation and reasoning in first-order predicate calculus

i. Syntax and semantics (chapter 7, pp. 185-198)

ii. Resolution proofs and unification
(chapter 9, only pp. 265-276 are required; the rest of chapter 9 is beyond the scope of this course. Supplementary material will be handed out.)

iii. Chapter 7, 198-210:
Axioms, definitions, and theorems
Representing events and states: the situation calculus
The frame, qualification, and ramification problems

iv. Types of KRR systems (chapter 10, pp. 297-298, 304-305, excerpts from 310-327)

v. Semantic nets and frames; inheritance

vi. Horn clauses and the closed world assumption
Translation to Prolog

4. Part IV: Planning (chapter 11)
   (a) Planning in the situation calculus
   (b) The Strips planning language
   (c) Partial-order planning
5. Part V: Machine Learning
   (a) Bayes theorem and intuitions behind Bayesian nets (chapter 14, pp. 415-426)
   (b) Decision-tree induction (chapter 18, pp. 525-543)
   (c) Genetic algorithms, if interest and time (portions of chapter 20)