CSCI–4150: Introduction to Artificial Intelligence
Fall 2005

Times: Mondays and Thursdays, 12:00 – 1:50pm
Classroom: Darrin 330
Text: Russell and Norvig, "Artificial Intelligence: A Modern Approach," 2nd ed.
Web: `http://www.cs.rpi.edu/academics/courses/fall05/ai/`

Instructor: Prof. Wes Huang
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office: Amos Eaton 107

TA: Kris Beevers
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Secretary: Shannon Carrothers
office: Amos Eaton 132

We will set regular office hours during the second week of classes; they will be announced in class and posted on the course web page. For the first two weeks, our office hours will be as follows:

Wed	8/31	3–4	Prof. Huang	Wed	9/7	10:30–12	Prof. Huang
Thu	9/1	2–4	Kris Beevers	Wed	9/7	3:30–5	Kris Beevers
Tue	9/6	4–5:30	Kris Beevers	Thu	9/8	4–5	Prof. Huang

Kris' office hours will be held in Amos Eaton 217.

Course description

This course is an introduction to the theory and practice of Artificial Intelligence. We will be studying techniques for solving problems and making intelligent decisions. The first half of the course will focus on the foundations of Artificial Intelligence: search and logic. The second half of the course will focus on machine learning techniques, including decision trees, reinforcement learning, and neural networks. Knowledge representation and uncertainty will be addressed in conjunction with several topics during the semester.

Students will implement many of the algorithms we cover in programming assignments. The implementation language for these assignments will be Scheme (a dialect of LISP) which will be taught in the first two weeks of the course.

The prerequisite for this course is CSCI–2300: Data Structures and Algorithms.

Course activities

Assignments There will be seven assignments, most of which will include a programming component. Assignments are to be done individually. The value of each assignment will vary with its length and difficulty; however, you can expect a two week assignment to be worth about twice as much as a one week assignment. All assignments count towards the assignment component of your final grade. Assignments, in general, will be due on Thursdays.

Quizzes There will be biweekly quizzes on Mondays starting in the third week of classes. These are intended to be short (about 20 minutes); they will serve to reinforce your understanding of the course material over the semester. There will be 7 quizzes during the semester; I will drop the lowest quiz scores from the quiz component of your final grade. *No make-up quizzes will be given!*

In-class exercises There will be some (unannounced) in-class exercises over the semester at irregular intervals in order to reinforce material during a class. These will be collected and either graded or checked off. There are no make-up exercises given.

Final Examination There will be a final examination to be scheduled by the registrar during the examination period (December 14–16 and 19–20).

Grading

Your final grade will be determined according to the following (tentative) breakdown:

44%	Assignments
20%	Quizzes
3%	In-class exercises
33%	Final examination

To ensure that students completing this course have breadth and experience commesurate with the scope of the course, students are required to receive a passing grade on at least three of Assignments 3–7 in order to receive a passing grade for the course.

Course policies

The following policies will be clarified or revised as necessary during the semester.

Late work

Unless you make *prior* arrangements with the instructor, assignments are due at the beginning of class (12:00 noon) on the day they are due. Within a certain time period after the deadline, I believe there is value in encouraging students to complete an assignment, so I do accept late work. However, late work delays the grading of assignments and is unfair to those students who turn in their work on time. The late policy is as follows:

1. For an assignment due at noon on a Thursday, late work may be turned in until noon of the following Monday but will be assessed a 10% penalty.

2. Each student has 6 grace half-days which will waive the late penalty on an assignment. At most 3 may be used on any one assignment deadline. You can only use these grace half-days in integral amounts, i.e., if you turn in something an hour late, you must use one half-day to avoid the late penalty.

3. Late penalties are rounded up and apply separately to each "component" of an assignment. The written work will generally be a single component, and a component for electronic code submission will consist of all code submitted to a single web tester.

4. Late written work must be turned in either:

   - in class, or
   - to Shannon Carrothers (AE 132) or to the CS main office (Lally 207). *Make sure you give your work to one of the secretaries in these offices who will record the time you turn it in!*

     Note that these offices are only open during business hours, so late written work can only be turned in on weekdays until 5pm.

5. We do not accept late work via email. Code must be turned into the web tester, and written work must be turned in on hardcopy as above.

Please note that a two week assignment will generally not be a "one night" assignment and manage your time accordingly.

Academic honesty

I encourage you to discuss the readings and assignments and to prepare for quizzes and the final examination with others. However, I expect that any assignment, quiz, exercise, or examination that you turn in to be your own work — the product of your understanding of the course material and your own efforts in completing the activity.

In particular, academic honesty has sometimes been a problem on programming assignments. Students naturally want to work together, and they can learn a great deal by doing so. Getting help

is often the best way to interpret error messages and find bugs, even for experienced programmers. In response to this, the following rules will be in force for programming assignments:

- Students may work together in designing algorithms, in interpreting error messages, in discussing strategies for finding bugs, but *not* in writing code or detailed debugging.
- Students may not share code, they may not copy code, and they may not discuss code in detail while it is being written or afterwards. This extends until after the late deadline.
- Students may not "show" their code to other students as a means of "helping them".

We use an automatic code comparison tool to help spot assignments that have been submitted in violation of these rules. However, a final detemination is made by the instructional staff after reviewing the evidence.

The Rensselaer Handbook of Student Rights and Responsibilities defines several types of academic dishonesty, all of which are applicable to this class, as well as procedures for responding to academic dishonesty. While a first infraction may result only in a 0 for that assignment or a reduction in that student's final grade, a repeated or egregious infraction may result in the student receiving a failing grade for this course.

Please contact the instructor if there is any question about academic (dis)honesty.

Attendance

I expect you to attend class; however, I do not take attendance. You are responsible for knowing all material covered in class. If you should miss a class, please contact a classmate first to learn what was covered that day. Also, I will attempt to keep the schedule on the course home page up to date.

Since there are no make-up quizzes, you must attend class to take the quizzes. The same holds for the in-class exercises.

Excuses

If there is some good reason that you will need an extension on an assignment, contact me *in advance*. If you do not contact me in advance, I will ask you to get a letter from the Dean of Students. They will verify excuses and write a memo. This way I can be assured of a valid excuse without needing to know details of students' personal lives.

Grading appeals

If you disagree with the grading on an assignment or quiz, you should appeal to the TA first; this is to maintain consistency in grading. If you are not satisfied with the outcome, then you should contact the instructor. Appeals must be made within two weeks after the assignment or quiz is returned.

Resources

We will be making extensive use of the course home page: most handouts will be available online through the web page, and additional information about assignments will be posted on the web page. We will be using WebCT for the discussion groups and for storing grade records.

There are a number of items on reserve at the library. The course home page has a list of these items.

The instructor and TAs will hold regular office hours; you can feel free to drop in during these times. You may also make an appointment to see the instructor or TAs outside of these times.

Changes

There may be changes to the policies, deadlines, and schedule described in this syllabus. You can expect me to give you reasonable notice of any changes. All changes will be announced in class and appear either on the course web page or on WebCT.

Tentative Schedule

Week		Date		Topic	Reading	Assignment
1	M	Aug	29	Intro: What is AI? Overview; Scheme I	1	A0 out
	R	Sep	1	Intro: Intelligent Agents; Scheme II	2	A1 out
2	M	Sep	5	NO CLASS — Labor day		
	R	Sep	8	Search: Search problems; Scheme III	3.1–3	A1 due; A2 out
3	M	Sep	12	Search: Blind search; Scheme IV	3.4–6	Quiz 1
	R	Sep	15	Search: Heuristic search	4.1	A2 due; A3 out
4	M	Sep	19	Search: Heuristic functions	4.2	
	R	Sep	22	Search: Local search	4.3–6	
5	M	Sep	26	Search: Constraint satisfaction	5	Quiz 2
	R	Sep	29	Search: Game playing search	6.1–2, 6.4	A3 due; A4 out
6	M	Oct	3	Search: Game playing search	6.3, 6.5–8	
	R	Oct	6	Reasoning: Introduction; Propositional logic	7	A4-I due
7	T	Oct	11	Reasoning: First Order logic (FOL)	8	Quiz 3
	R	Oct	13	Reasoning: Inference in FOL	9.1–4	
8	M	Oct	17	Reasoning: Resolution in FOL	9.5–6	
	R	Oct	20	Reasoning: Knowledge representation		A4-II due; A5 out
9	M	Oct	24	Learning: Introduction; Decision trees	18	Quiz 4
	R	Oct	27	Learning: Probability, Bayes' rule	13.1–6	
10	M	Oct	31	Learning: Bayesian classifiers		
	R	Nov	3	Learning: Bayesian classifiers		A5 due; A6 out
11	M	Nov	7	Learning: Perceptrons & neural networks	20.5	Quiz 5
	R	Nov	10	Learning: Statistical learning methods		
12	M	Nov	14	Learning: Utility & decision making	16.2–3, 17.1	
	R	Nov	17	Learning: Reinforcement learning	17.2–3	A6 due
13	M	Nov	21	Learning: Reinforcement learning	21	Quiz 6; A7 out
	R	Nov	24	NO CLASS — Thanksgiving break		
14	M	Nov	28	Applications: TBA		
	R	Dec	1	Applications: TBA		
15	M	Dec	5	Applications: TBA		Quiz 7
	R	Dec	8	Applications: TBA		A7 due
		TBA		Final Exam (during exam period)		

The readings refer to chapters and sections of our text.

Tentative assignment topics

assignment	topic
1	Scheme programming
2	Scheme programming
3	A* search (sliding block puzzles)
4	Game playing search (Connect 4)
5	Logic
6	Learning (decision trees/classifiers)
7	Learning (game playing?)