Messiah College COSC 418 Artificial Intelligence
Fall 2006 Syllabus

Course Description

COSC 418 Artificial Intelligence (AI) is an overview of computer reasoning systems: Intelligent agents, knowledge representation and reasoning, inference, neural networks, genetic algorithms, natural language processing, robotics, computer vision, and philosophical & ethical issues.

Course Website

www.messiah.edu/~chase/csc/418

Course Objectives

In addition to developing problem-solving skills and quantitative analysis, which are parts of every course in the Department of Mathematical Sciences, the following specific objectives obtain for this course:

1. To program effectively in an AI language.
2. To recount a broad understanding of the history, current status and projected future of AI.
3. To recommend appropriate AI-based solutions to practical problems that you pose.
4. To present to our class the results of your learning in more depth one aspect of AI that interests you specially.
5. To evaluate from a Christian perspective the philosophical and ethical issues that confront AI.
6. To work in teams to solve problems by building models that an AI agent could use.

Prerequisite

COSC 282 Data Structures and Algorithms

Instructor

Dr. Gene B. Chase. Office, Frey 123, extension 2770. Office hours any Monday, Wednesday, or Friday afternoon, and by appointment at other times. A signup sheet on my office door contains places for you to sign a day in advance for an automatic appointment. If on shorter notice, just call or stop by to see if I'm free. For the fixed part of my schedule, see my web site under Schedule: www.GeneBChase.com

Text

Stuart Russell and Peter Norvig. *Artificial Intelligence: A Modern Approach* (second edition). Prentice Hall 2003. ISBN 0-13-790395-2. The text website contains much valuable information, including errata for the text and sample programs in various computer languages including Java. The website is aima.cs.berkeley.edu

Grading

Grading for this course is based on the following work:

- 50% Four closed-book, non-comprehensive exams.
  Exams cover readings and lectures. See below for exam dates.
- 30% Homework, including a team robotics lab.
- 10% Group or individual end of semester presentation.
  An oral presentation and an html document with resources related to your project form this part of your grade. More details will be provided at our course web site.
- 10% In-class participation throughout the semester.
  Participation includes such things as timeliness, attitude, engagement, collaboration, attention, and oral presentation of homework when asked.

Your final letter grade is calculated as follows: A ≥ 93%; A- ≥ 90%; B+ ≥ 87%; B ≥ 83%; B- ≥ 80%; C+ ≥ 77%; C ≥ 73%; C- ≥ 70%; D+ ≥ 67%; D ≥ 60%; F < 60%

Make-up exams are given for verified emergencies. Late assignments are not accepted without prior arrangement, and only under special circumstances, such as your illness or problems with Messiah College's computer system. (Note: This is different from my lower division courses where late work was permitted with a daily penalty.) Make obsessively frequent backups of all your work so that your computer system will not be a cause for your late work.

Lab Etiquette

In-class time allocated for lab work must be spent doing the assigned lab. You will be asked to leave if you are using email or instant messaging or surfing the internet.

Academic Integrity

Academic integrity is taken very seriously at Messiah College. Violations will result in severe consequences, including possibly failing this course. The complete policy is incorporated into this syllabus by reference. You are not properly registered for this course unless you have read and understand this policy. See pp. 38–40 of the 2006-07 Student Handbook (available online at http://www.messiah.edu/offices/student_affairs/student_handbook/resources/0607/academic.pdf
Violations include (but are not limited to):

1. Plagiarism. Examples: failing to cite a reference, failing to use quotation marks where appropriate, misrepresenting another's work as your own.
2. Cheating: Attempting to use or using unauthorized material or study aids for personal assistance in examinations or other academic work. Examples: using a cheat sheet, altering a graded exam, looking at a peer's exam.
3. Fabrication: Submitting altered or contrived information. Examples: falsifying sources and/or data, etc.
4. Facilitating academic dishonesty. Examples: working together on an assignment where collaboration is not allowed, doing work for another student, allowing one's own work to be copied.

5. Computer Offenses: Altering or damaging computer programs without permission. Examples: software piracy, constructing viruses, introducing viruses into a system, or copying copyrighted programs.

Americans with Disabilities Act (ADA)

Any student whose disability falls within ADA guidelines should inform me within the first two weeks of class about any special accommodations or equipment needs that are necessary to complete the requirements for this course. Students must register documentation of any disability with the Office of Disability Services (Hoffman 101). If you have questions, call Dr. Keith Drahn at ext. 5387, or see me at my office.

Appreciations

I have had valuable discussions with four Messiah College faculty about artificial intelligence. Dr. Robert Kilmer and I co-taught this course in 1999. I attended Dr. Eugene Rohrbaugh's January course in computational linguistics in 2005. Dr. Rohrbaugh has been generous with his course materials from that course and for this course from 2001 and 2004 (www.tigerRam.com). Dr. William Strausbaugh and I discussed automatic translation between computer languages while he was doing graduate work. Dr. Paul van Arragon taught this course in 1994 and 1996.

The Summer Institute of Linguistics hosted me for two academic sabbaticals (1982–1983, 1987–1988) for work in computational linguistics as applied to Bible translation.

Tentative Schedule

This schedule will flex for guest presentations. Because we are hiring Computer Science faculty, we may hear from prospective candidates for positions. Two have been scheduled as of version 1.0 of this syllabus. Check on-line at the course website for the unfolding truth.

Week	Date	Day	Topics (chapters)	Reading Due
1	Aug 30	W	AI overview (1)	
	Sep 1	F	Student presentations	ch 1
2	Sep 4	M	***Data Mining*, Dr. Bill Pottenger, Lehigh University**	
	Sep 6	W	More student presentations	ch 2
	Sep 8	F	Philosophical foundations (26)	ch 26
3	Sep 11	M	Discussion of chapters 1, 2, 26	
	Sep 13	W	LAB01: Robotics (Frey 51 & 341)	
	Sep 15	F	**Exam 1**, covering through Wednesday, Sep 13, material	
4	Sep 18	M	Solving problems by searching (3)	ch 3
	Sep 20	W	Uninformed search strategies (3)	ch 3
	Sep 22	F	LAB02: SOAR or PDDL	
5	Sep 25	M	LAB03: Uninformed Search	
	Sep 27	W	Informed Search (4)	ch 4 p94–116
	Sep 29	F	Genetic Algorithms	ch 4 p116-134
6	Oct 2	M	Genetic Algorithms	
	Oct 4	W	Constraints (5)	ch 5 (partial)

	Oct 6	F	**Exam 2**	
7	Oct 9	M	Logical Agents (7)	ch 7
	Oct 11	W	Statement Logic (7)	ch 7
	Oct 12–15	F	Mid-Fall Recess	
8	Oct 16	M	LAB04: SOAR or PDDL	
	Oct 18	W	SL: quick falsification	ch 7
	Oct 20	F	***CYC*, Dr. Eugene Rohrbaugh, California Baptist University**	
9	Oct 23	M	***CYC*, Dr. Rohrbaugh, continued**	
	Oct 25	W	First Order Logic (8)	ch 8
	Oct 27	F	First Order Logic (8)	ch 8
10	Oct 30	M	First Order Logic (8)	ch 8
	Nov 1	W	**Exam 3**	
	Nov 3	F	Quantifier Laws	
11	Nov 6	M	Prenex Normal Form	
	Nov 8	W	Knowledge Representation	
	Nov 10	F	Learning: introduction	
12	Nov 13	M	Neural networks (20.5)	p51-54, 649-653
	Nov 15	W	Neural networks	p736-748
	Nov 17	F	LAB05: NN (20.7)	p752-754; 757-759
13	Nov 20	M	**Exam 4**	
	Nov 22-26	W, F	Thanksgiving Break	
14	Nov 27	M	Neural networks	
	Nov 29	W	Bayesian learning	
	Dec 1	F	Student Presentations	
15	Dec 4	M	Student Presentations	
	Dec 6	W	Student Presentations	
	Dec 8	F	Course wrap-up	
16	Dec 12, 1:30	Tu	**Final Exam**	