CS339: Artificial Intelligence
Course Syllabus

General Info:

Professor	Matt Kretchmar
Office	207 Olin
Office Hours	Mon 1:30-3:30, Tue 10:30-11:30, Wed 1:30-2:50, Fri 9:30-10:30
Email	kretchmar@denison.edu
Resource Page	`www.denison.edu/~kretchmar/cs339`
Textbook	*Machine Learning: An Algorithmic Perspective, 2nd Ed* by Stephen Marsland

Grades:

Item	Number	Points
Research Projects	4	100
Final Exam	1	100
Total		500

Course Goals:

The course is designed to be an immersive experience in artificial intelligence. While AI is a very broad field encompassing many subdisciplines, this particular offering will focus more narrowly on machine learning. The course favors depth instead of breadth in that students will have a more substantive opportunity to engage in a smaller number of topics. The course is also designed to allow students to explore fundamental problems in the field and to think imaginatively how to apply the tools and techniques we discuss in class to solve the research problems. It is the intent that students will be instrumental in guiding the class discussions and for actively steering the nature of the discussion.

The course is also designed to be open to a wide range of backgrounds. Specifically, prior programming experience is not strictly required. Students are expected to assess their particular skill set (programming, design, analysis, mathematical formulation) to understand how they may contribute to the course. Most of the research projects will be done in small teams of 3 or 4 students.

Writing plays a central role in this course; this course satisfies Denison's *intensive writing seminar* requirements – it is a W-overlay GE designation. Rather than included as an add-on, writing will be woven centrally into the course design. Students will compose reflections, construct research papers, read critically and

analyze other research papers, and collegially reflect on other student's work in the class. The writing activities are constructed to illustrate that writing is thinking, rather than writing is mere communication after the thinking is done.

Research Projects:
This course is research-based. The learning goals and course structure are organized around group-based, research projects in areas of Artificial Intelligence. The semester will feature four large research projects, each organized around a unit for the class. Students will investigate a major AI problem and employ the research methods discussed in class and in the text in an effort to solve the AI problem. Students will write a research paper about their findings. Submission for the assignment will be the research paper and possibly code items that may be requested.

Topic	Due Date (tentative)
Unsupervised Learning & Clustering	Oct 2
Supervised Learning & Classification	Oct 30
Reinforcement Learning & Control	Nov 20
Genetic Algorithms & Optimization	Dec 11

Final Exam:
There is a comprehensive final exam on Thursday, December 17, 9am to 11am.

Class Structure:
Each of the four major units will cover about three weeks of the course. Each unit will have the same basic structure:

- Assigned readings from the course textbook and research papers.

- In class discussions, demonstrations, analysis of algorithm performance. The "lectures" will focus primarily on the advanced aspects of the main algorithms; students are expected to learn the algorithm foundations in the assigned reading.

- Group selection of a particular project for each unit. Groups will need to find data sets and an application where this particular algorithm provides a useful tool for the problem domain.

- Groups will implement the algorithm and apply it to their problem domain.

- *Simultaneous* with the implementation, groups compose a research paper illustrating their experimental findings. The writing process will coincide with the experimentation so that the act of writing informs and is informed by the analytical work.

Policies:

A small, research based and highly participatory class such as this only works if everyone is engaged. Your physical and mental participation is required. You are expected to attend class, come well prepared, participate in discussions and engage your fellow students. If you miss class it is your responsibility to cover the material or activity that you missed. Excessive absence (or unpreparedness) in class may result in a lowering of your class grade and may impact other parts of your course grade; the instructor will approach you if absenteeism seems to be a problem.

Academic integrity is of the utmost importance. A good rule to follow is to make sure the work you submit reflects your own intellectual achievements and not those of someone else. In a course like this where the intellectual work is shared among a team of students, it will be important that each student contribute actively to the team's effort. Cases of academic fraud are reported to the institution (where they may affect your permanent record) and will incur a course grade penalty such as failure for the assignment or failure for the whole course. If you have any doubts or gray areas, please first ask the professor.

Any student who feels he or she may need an accommodation based on the impact of a disability should contact the instructor privately as soon as possible to discuss his or her specific needs. The instructor relies on the Academic Support & Enrichment Center in 104 Doane to verify the need for reasonable accommodations based on documentation on file in that office.

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