Intro to Artificial Intelligence

Course Details

Course Designator & Number: MADR 4511W

Number of Credits: 4

Language of Instruction: English

Contact Hours: 60

Instructor: Onsite Faculty

Course Description

This course provides a technical introduction of fundamental concepts of artificial intelligence (AI) and their applications to real-world problems. Topics include: history of AI, agents, search (search space, uninformed and informed search, constraint satisfaction, game playing), knowledge representation (logical encodings of domain knowledge, logical reasoning systems), planning, and an introduction to machine learning. The course is suitable for students who want to explore the field of artificial intelligence and build the foundations for more advanced work in AI.

Coursework

The course is writing intensive and will include writing instruction and various forms of writing:

- A report on your class project will be due in three parts: a proposal (1–2 pages), an intermediate report with a literature review (4-5 pages), and a final report (10-12 pages). You will be allowed to resubmit your intermediate report after receiving feedback. You will incorporate your intermediate report into your final report.

- You will be asked to read at least two technical articles and write a summary and critique (1–2 pages) for each article. You will be allowed to resubmit your writings after receiving feedback.

- The homework will include questions that require explanations of the methods/ideas you learned about.

Students are expected to read approximately 30 pages/week from the textbook and to spend 15–16 hours/week on average for the course (3 hours of lecture time, 4 hours reading the textbook and studying, 9 hours working on homeworks/writing assignments/projects).

Coursework will include:

- Four written homework assignments including problem solving, short essays, and programming problems; writing assignments can be resubmitted for regrading
- Four writing assignments, including critiques of published articles, a project proposal, and a literature review
- One 10- to 12-page report on a topic of your own choice
- Participation to class discussion and other in class activities
- Two midterms and a final exam

Required Reading / Materials

Stuart Russell and Peter Norvig, "Artificial Intelligence. A modern approach. 4th Edition," Prentice-Hall, 2020 (Chapters 1-12).

The software from the textbook is available at https://github.com/aimacode. Download the Lisp software from http://aima.cs.berkeley.edu/lisp/doc/install.html and the Python software from https://github.com/aimacode/aima-python. You are free to use Lisp or Python. We will use the software for some homework.

Students are expected to have the following background:
- Knowledge of basic computer science principles.
- Knowledge of data structures (graphs and trees).
- Knowledge of formal logic (propositional and predicate logic).

Grading

Grading Rubric

Letter Grade	Score or Percentage	Description
A	93–100	Achievement that is outstanding relative to the level necessary to meet course requirements.
A-	90–93	Achievement that is significantly above the level necessary to meet course requirements.
B+	87–80	
B	83–87	
B-	80–83	Achievement that meets the course requirements in every respect.
C+	85–80	
C	65–75	
C-	60–65	Achievement that is worthy of credit even though it fails to fully meet the course requirements.
D+	55–60	
D	50–55	
F	0–50	Represents failure (or no credit) and signifies that the work was either (1) completed but at a level of achievement that is not worthy of credit or (2) was not completed and there was no agreement between the instructor and the student that the student would be awarded an I.

Summary of How Grades Are Weighted

Assignments	Percentage of Grade
Homework	30%
Writing assignments	16%
10- to 12-page report	15%
In-class discussion and activities	14%
Midterms & final exam	25%
Overall grade	**100%**

Assessment Details

Exams are open books and notes. Late homework will lose 10% of the maximum total points for every weekday late. Late homework will be accepted up to a week after it is due.

Course Content

Here is a tentative class schedule (subject to changes).

Unit 1

Ch 1, 2
- Intro to AI. Intelligent Agents

Unit 2

Ch 3
- Problem Solving and Search

Unit 3

Ch 3
- Heuristic Search
- Homework 1

Unit 4

Ch 4
- Other Search Algorithms
- Writing 1

Unit 5

Ch 5
- Game Playing
- Homework 2

Unit 6

Ch 6
- Constraint Satisfaction
- Writing 2

Unit 7
- Review
- First Midterm

Unit 8

Ch 7
- Propositional Logic
- Homework 3

Unit 9

Ch 8
- First-Order Logic
- Writing 3

Unit 10

Ch 9
- Inference in First-Order Logic
- Homework 4

Unit 11

Ch 10

- Knowledge Representation
- Writing 4

Unit 12

- Review
- Second Midterm

Unit 13

Ch 11

- Planning
- Homework 5

Unit 14

- Neural networks or machine learning topic

Unit 15

- Wrap-up
- Project Report

Policies

Attendance Policy

Students are expected to be on time and attend all classes while abroad. Many instructors assess both attendance and participation when assigning a final course grade. Attendance alone does not guarantee a positive participation grade; the student should be prepared for class and engage in class discussion. See the on-site syllabus for specific class requirements.

University of Minnesota Policies & Procedures

Academic integrity is essential to a positive teaching and learning environment. All students enrolled in University courses are expected to complete coursework responsibilities with fairness and honesty. Failure to do so by seeking unfair advantage over others or misrepresenting someone else's work as your own can result in disciplinary action. The University Student Conduct Code defines scholastic dishonesty as follows:

Scholastic Dishonesty

Scholastic dishonesty means plagiarizing; cheating on assignments or examinations; engaging in unauthorized collaboration on academic work; taking, acquiring, or using test materials without faculty permission; submitting false or incomplete records of academic achievement; acting alone or in cooperation with another to falsify records or to obtain dishonestly grades, honors, awards, or professional endorsement; altering forging, or misusing a University academic record; or fabricating or falsifying data, research procedures, or data analysis.

Within this course, a student responsible for scholastic dishonesty can be assigned a penalty up to and including an "F" or "N" for the course. If you have any questions regarding the expectations for a specific assignment or exam, ask.

Student Conduct

The University of Minnesota has specific policies concerning student conduct. This information can be found [on the Learning Abroad Center website](#).

Academic Integrity

All work submitted for the class must represent individual effort unless group work is explicitly allowed. You are free to discuss course material with classmates, TAs, and professor, but you should never misrepresent someone else's work as your own. It is your responsibility to protect your work from unauthorized access. Sharing your CSE lab account and/or password is a violation of the acceptable use policy for CSE Labs accounts and will result in account termination. Collaboration on exams, copying homework solutions from classmates, or copying

solutions from the web is cheating and grounds for failing the course. Any student caught cheating will be subject to disciplinary actions.

Disability Accommodations

The University of Minnesota views disability as an important aspect of diversity and is committed to providing equitable access to learning opportunities for all students. The Disability Resource Center (DRC) is the campus office that collaborates with students who have disabilities to provide and/or arrange reasonable accommodations. Students who have, or think they may have, a disability (e.g. mental health, attentional, learning, vision, hearing, physical or systemic), are encouraged to contact DRC to arrange a confidential discussion at 612.626.1333 or email drc@umn.edu. Additional information is available here.

Student Mental Health & Stress Management

As a student you may experience a range of issues that can cause barriers to learning, such as strained relationships, increased anxiety, alcohol/drug problems, feeling down, difficulty concentrating, etc. These mental health concerns or stressful events may lead to diminished academic performance or reduce a student's ability to participate in daily activities. University of Minnesota services are available to assist you with addressing these and other concerns you may be experiencing. You can access the broad range of confidential mental health services available on campus.

Sexual Harassment

Sexual harassment means unwelcome sexual advances, requests for sexual favors, and/or other verbal or physical conduct of a sexual nature. Such conduct has the purpose or effect of unreasonably interfering with an individual's work or academic performance or creating an intimidating, hostile, or offensive working or academic environment in any University activity or program. Such behavior is not acceptable in the University setting. For additional information, consult Board of Regents Policy.