CS 300 - Artificial Intelligence
Fall 2021

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Office Hours: (In-person, HS 218) MWF 10:30-11:30 AM
(Virtual) Th 10:00-11:00 AM
Zoom link on Canvas
Or by appointment

Lectures: MWF 12:40-1:40 Halsey 270

Prerequisites: A grade of C or better in CS 271

Textbook: No required textbook

Suggested Reference:
A great encyclopedic reference, especially if you do more with AI after this course, is *Artificial Intelligence, A Modern Approach* by Stuart Russell & Peter Norvig, 4th Edition (2020), Prentice Hall.

Course Website: UWO Canvas

Statement Regarding Classroom Mask Requirements:
- All students are required to wear an appropriate face mask that covers their mouth and nose when they are in the classroom.
    - Students who have a medical condition prohibiting them from wearing a face mask may present written documentation from their health care provider, stating that the individual cannot wear a face mask. Students must present this documentation to the Accessibility Center in the Dean of Students office. In these situations, face shields will be provided to that student through the Risk & Safety Office upon request from the Accessibility Center.
- UWO procedure dictates that, during the COVID-19 pandemic, an instructor cannot begin class until all students are wearing a mask properly. If a student is non-compliant with the masking policy and also refuses to leave the classroom promptly when requested, the instructor is required to cancel class. Students responsible for class cancelation for these reasons will be referred to the Dean of Students office, and the student will be unable to attend class until they meet with the Dean of Students. The student may be dropped from the class by the Dean of Students.

Statement Regarding Eating or Drinking in Classrooms:
- Eating and drinking is prohibited in classrooms. There may be students who have a medical condition that requires them to eat at certain times of the day, or when certain symptoms present themselves. If, and only if, a student has documentation from the Accessibility Center in the Dean of Students office that they may eat during class will this be allowed. When possible, the student should be assigned a seat furthest away from other students to reduce risk of exposure of aerosols produced while eating. The student is expected to replace their mask as soon as they have finished eating.

Course Description
This course is an introduction to the field of artificial intelligence. A survey of classical search in artificial intelligence and machine learning, and an in-depth examination of a specific application area such as robotics, theorem proving, computer vision, natural language processing, etc. are covered. Students are expected to demonstrate mastery via computer programs using the techniques of artificial intelligence.

Course Outcomes
1. With respect to the philosophical foundations of Artificial Intelligence (AI):
   a) describe the different characterizations of AI
   b) identify how those characterizations apply to various stages in the historic development of AI as discipline
   c) explain how the PAGE model in stimulus-response agents (Percepts/Actions/Goals/Environments) is used to characterize different types of stimulus-response agents
   d) determine rational actions for an stimulus-response agent based on maximizing goals given a set of percepts

2. With respect to classical search:
   a) formulate certain AI problems as state-space search
   b) identify, manually trace and contrast uninformed search methods such as depth-first, breadth-first, uniform-cost and iterative deepening
   c) explain the concept of heuristics and manually trace informed search methods such as A-star
   d) identify, manually trace and contrast local search methods such as gradient descent, simulated annealing and genetic algorithms
   e) formulate constraint satisfaction problems and apply consistency algorithms such as AC-3 to solve them
   f) identify and manually trace adversarial search algorithms such as minimax and alpha-beta pruning
   g) design heuristic evaluators for a given adversarial search space

3. With respect to learning:
   a) identify and explain general concepts of learning such as function fitting, attributes and classes, bias and over fitting
   b) describe and manually trace the perceptron learning algorithm for perceptrons with a limited number of inputs and outputs
   c) explain the role of an activation function in hidden layer networks
   d) explain how the back propagation training algorithm works in hidden layer networks
   e) represent inductive concept learning via decision trees
   f) apply the information gain method in choosing the "best" attribute of a node and manually trace the construction of a decision tree via the ID-3 algorithm
   g) construct a Bayesian network to model a problem with probabilistic information
   h) represent and answer queries in uncertain circumstances in terms of their conditional probabilities
   i) explain and manually trace the Naïve-Bayes algorithm

4. With respect to ONE selected "big application" area of AI such as Reasoning and Theorem Proving, Natural Language Processing, Computer Vision, Robotics, Multiagent Systems, etc:

a) identify and describe the motivation, terminology, foundations and key concepts in the selected area
b) describe and manually trace the essential algorithms in the selected area
c) use available libraries and software to test the key algorithms and extend them to specific application projects in the selected area

Course Grading Policy
Your final grade for this course will be based on three components, namely exams, assignments, and review problems. Your overall numerical grade for the course will be computed as the weighted sum of the component grades using the following weights:

Component	Weight
Exams (4)	55%
Assignments	25%
Mini Homework	20%

Tentative Exam Dates are as follows:

- **Exam 1 – Monday, 9/27**
- **Exam 2 – Wednesday, 10/20**
- **Exam 3 – Monday, 11/15**
- **Exam 4 – Wednesday, 12/15**

Your letter grade for the course will be completed as follows:

Numerical Score	Grade	Numerical Score	Grade
>=92	A	72-78	C
90-92	A-	70-72	C-
88-90	B+	68-70	D+
82-88	B	62-68	D
80-82	B-	60-62	D-
78-80	C+	<60	F

While this overall grading scheme is fixed, I will be happy to discuss any issue you may have with individual grades. If you notice a mistake or have a question regarding a specific grade, please come and talk to me *as soon as possible*. Do not wait until the end of the semester to bring up grading issues.

Assignment/Mini Homework Deadlines
Mini homework are distributed in lecture and are generally due back at the start of the next lecture. Late mini homework submissions will NOT be accepted.

Each assignment comes with a deadline (day and time) by which it must be submitted. You are allotted *three* assignment credit days you can use through the semester. A credit day is exactly 24 hours or less. You can use unused credit days to submit an assignment after its deadline, without penalty. Any assignment submitted after the deadline, plus any credit days you have unused, will receive a zero.

For example, if you have 2 unused credit days available and an assignment is due on Tuesday at 5:00PM, you can submit it anytime by exactly Thursday at 5:00PM without penalty. Do note that if

you submit your assignment on Thursday at 5:01PM, you will be penalized 100% of the score of the assignment and thus receive a zero! Note also that if you submit your assignment on Wednesday at 5:01PM, you will be charged two credit days (but no penalty, obviously).

Attendance Policy:
I do not require attendance for this course, but I do encourage you to attend and hope it will be beneficial to you. When attending class, please do come prepared for, and participate actively, in it. Material may be discussed during the lectures that is not available on Canvas. If you miss class, it is your responsibility to make sure you catch up on anything you may have missed.

Extensions and Makeups:
Extensions on deadlines may be granted at the discretion of the instructor if you provide a valid justification (in the form of a written excuse from a medical doctor or the Dean of Students Office) **before** the due date.

Collaborating versus Cheating:
Unless otherwise stated in the assignment or project, all submissions must be entirely your own work. While it is acceptable to discuss the homework and assignments at a high level (for example, at the design level) with others, you must submit your own work. **You may not "borrow" any piece of code or design of any length from someone else, the internet, or any other source, unless you can live with a zero and the other potential academic sanctions of cheating** (see UWO Student Discipline Code 2007, Chapter UWS 14).

Accommodations:
The University of Wisconsin Oshkosh supports the right of all enrolled students to a full and equal educational opportunity. It is the University's policy to provide reasonable accommodations to students who have documented disabilities that may affect their ability to participate in course activities or to meet course requirements.

Students are expected to inform instructors of the need for accommodations as soon as possible by presenting an Accommodation Plan from either the Accessibility Center, Project Success, or both. Reasonable accommodations for students with disabilities is a shared instructor and student responsibility.

The Accessibility Center is part of the Dean of Students Office and is located in 125 Dempsey Hall. For more information, email accessibilitycenter@uwosh.edu, call 920-424-3100, or visit the Accessibility Center Website.

Statement Regarding Diversity, Equity & Inclusion:
Diversity drives innovation, creativity, and progress. At the University of Wisconsin Oshkosh, the culture, identities, life experiences, unique abilities, and talents of every individual contribute to the foundation of our success. Creating and maintaining an inclusive and equitable environment is of paramount importance to us. This pursuit prepares all of us to be global citizens who will contribute to the betterment of the world. We are committed to a university culture that provides everyone with the opportunity to thrive.

Required Disclosure Statement:
Students are advised to see the following URL for disclosures about essential consumer protection items required by the Students Right to Know Act of 1990:
https://uwosh.edu/financialaid/consumer-information/