CS 2400 Introduction to Artificial Intelligence

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Term: Spring 2020

Office hours: by Appointment

**Description**

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| --- |
| The objective of this course is to introduce the basic concepts of artificially intelligent systems. Topics covered include knowledge representation, problem solving using search and the agent framework. The role of AI in engineering and computing systems is presented, and students complete exercises that develop skills in applying AI tools and languages to real-world problems.  Prerequisites: CS 2852, CS2300 and (MA2310 or MA1830). |

**Outcomes**

Upon successful completion of this course, the student will:

* Understand what constitutes artificial intelligence and be able to identify such systems as well as their limitations
* Possess an understanding of knowledge representation and the agent framework
* Implement a variety of artificial intelligence techniques to solve problems including game play, search, and min-max
* Apply propositional and first-order logic
* Solve problems using reinforcement Q-learning
* Understand machine learning concepts

## Textbook

* Required:
  + Artificial Intelligence: Foundations of Computational Agents, Poole and Mackworth
  + Available for free online <https://artint.info/2e/html/ArtInt2e.html>
* Optional:
  + Artificial Intelligence Illuminated, Ben Coppin 0763732303, <https://www.amazon.com/Artificial-Intelligence-Illuminated-Jones-Bartlett-dp-0763732303/dp/0763732303>
  + Artificial Intelligence: A Modern Approach, Stuart Russel, Peter Norvig 0136042597, <https://www.amazon.com/Artificial-Intelligence-Modern-Approach-3rd/dp/0136042597>

**Grades**

Grades will be posted in Blackboard as soon as they are available. Please monitor your grades in Blackboard and notify the instructor ASAP if you notice any errors in your grades. The grading scheme is as follows:

|  |  |
| --- | --- |
| **Item** | **Percentage** |
| Labs | 30% |
| Individual Assessments (quizzes, midterm) | 20% |
| Synchronous Participation | 10% |
| Final Group Project | 20% |
| Final Exam | 20% |

**Grading Scale**

|  |  |
| --- | --- |
| A | >=93% |
| AB | >=89% |
| B | >=85% |
| BC | >=81% |
| C | >=77% |
| CD | >=74% |
| D | >=70% |
| F | <70% |

## Tools

We will be using several tools:

* Blackboard
  + Lecture Slides (posted after the quiz deadlines)
  + Grades
  + Quizzes
  + Exam
  + Lab submission (or Esubmit)
* Esubmit
  + Lab submission (or Blackboard)
  + <https://esubmit.msoe.edu/>
* VidGrid
  + Lecture Videos: <https://app.vidgrid.com/content/qrQ4YucJfIoN>
* Microsoft Teams (CS2400- Riley channel)
  + Announcements/information in the “General” channel
    - Note that this channel is open to ALL students in CS2400 sections
  + Section specific material in the “Riley” channel
  + Lecture discussion delivery
    - Synchronous- live meetings you are expected to participate in during a given time window
  + Synchronous lecture discussion/questions
  + Team discussion (using team-specific channel) for team-based final projects
* Outlook Calendar
  + Scheduling for synchronous meetings
  + Synchronous meetings will only happen during scheduled course times

**Asynchronous Video Lectures and Quizzes**

Videos for the class will be posted on VidGrid. You are welcome to watch them on your own pace as they are posted. Quizzes will be available on Blackboard during the week of the video topic. Quizzes each have their own deadline indicated in the schedule at the bottom of this document.

All quizzes are 1-attempt only, timed quizzes (unless there are major flaws in the quiz that the instructor needs to correct). Please plan accordingly.

Lecture slides will be posted on Blackboard AFTER the quiz deadline. This means you are expected to be taking notes while watching the videos.

During quizzes, you are welcome to use your notes and the videos, but since the quizzes are timed, re-watching the video will not be a useful strategy for answering all the questions correctly.

**Synchronous Meetings**

These will be scheduled via Outlook Calendar during class lecture and lab times ONLY. Your attendance is mandatory, and these meetings will be recorded to evaluate participation. You are expected to have your video **ON** during these meetings to discourage multitasking. You should make sure you are in a relatively quiet location (realizing that unexpected ambient noise will happen). Please mute yourself unless you want to speak to avoid unnecessary noise on the call.

To get the instructor’s attention in large (full class) synchronous meetings, please enter a single character (such as “Q”) in the chat window. If your chat message has been ignored by the instructor, feel free to verbally interrupt.

You will be allowed to miss two synchronous meetings without it negatively affecting that portion of your grade. If timing of scheduled lectures and labs doesn’t work for your situation, please let the instructor know ASAP.

## Laboratory

You are expected to read the ENTIRE assignment before asking questions. Detailed submission expectations will be included with each lab.

All labs will be handed in through Esubmit or Blackboard. Within the Blackboard section of the class, you should select the “Content” tab, and the labs will be posted as assignments. There will be detailed lab and submission instructions included with every assignment. Please read them carefully and ask questions when you have them. Esubmit will require that you use a VPN connection so please make sure you have the VPN installed: <https://faculty-web.msoe.edu/hasker/resources/vpn.html>

The scheduled laboratory times for the class will start with a synchronous meeting to discuss the lab and answer questions. Reminder: Your attendance at this meeting is mandatory. The professor will be available after the meeting for individual questions, so you are encouraged to open a 1:1 video chat if you have specific questions or are asking questions that might give away part of the solution in the larger synchronous meeting.

## Final Group Project

The final group project will be discussed later in the term. Stay tuned!

## Make Ups

Make up quizzes, labs, exams are not available unless extenuating circumstances exist. Ask the professor if you believe you qualify. It is always favorable for your case if you ask before a due date. Near the end of the quarter make up and extension requests are rarely granted.

## Professionalism

All work submitted by you is expected to be your own writing unless explicitly allowed in the assignment. **Copying and pasting code from other students, the internet or any other sources other than the professor is considered plagiarism and is not allowed.** If copying and pasting is discovered, it will cause the submitter to earn a 0 on the lab/assignment, and depending on the circumstances, it may cause the submitter to earn a 0 in the course. IF YOU ARE UNSURE if “borrowing” code is allowed, please ask. It is better to ask for permission than forgiveness in this instance.

If you suspect another student of cheating on anything in the class, you are expected to report the activity to the professor within 24 hours of your realization. The professor will keep reports of cheating confidential. Failure to report cheating activities of other students implicates you as complicit in the activity.

Cases of suspected plagiarism or cheating will be submitted to the Vice President of Academics and may become part of your permanent academic record as per campus policy.

## Special Accommodations

If you require special accommodations, please notify the instructor within the first three (3) weeks of the quarter to ensure adequate time to provide appropriate accommodations.

## Tentative Schedule

## Subject to change

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Wk. | Date | Lecture/Video Topic Posted | Synchronous Activity During Scheduled Time | Asynchronous Activity due by 11:59PM |
| 1 | T 3/10 | Introduction to AI, Turing Test |  |  |
| R 3/12 |  | Lab 1: Current Events |  |
| F 3/13 |  |  |  |
| 2 | T 3/24 | Intro to Search | Discuss course, L1 | Lab 1 Post Complete, Read Ch 1 |
| W 3/25 | BFS/DFS |  | Lab 1 Discussion on Teams, Quiz 1 |
| R 3/26 |  | Introduce L2 | Esubmit Exercise (blackboard), Read Ch 3.1, 3.2, 3.3, 3.4, 3.5 |
| F 3/27 |  | Discuss Search Lecture in small groups (outlook/teams) | Quiz 2 |
| 3 | T 3/31 | A\*, Heuristics | Optional: Lab 2 Q&A | Lab 2 |
| R 4/2 |  | Introduce L3 | Read Ch 3.6 |
| F 4/3 |  | Discuss A\* Lecture in small groups (outlook/teams) | Quiz 3 |
| 4 | T 4/7 | More Search | Discuss More Search Lecture in small groups, Optional Lab 3 Q&A | Lab 3 |
| R 4/9 |  | Introduce L4 | Quiz 4 |
| F 4/10 |  | NONE – Good Friday |  |
| 5 | T 4/14 | FOL, PL | Discuss FOL, PL Lecture in small groups, Optional Lab 4 Q&A | Lab 4 |
| R 4/16 |  | Introduce L5, Midterm Review | Read Ch 5 |
| F 4/17 |  | MIDTERM Exam |  |
| 6 | T 4/21 | Neural Networks | Optional Lab 5 Q&A | Lab 5 |
| R 4/23 |  | Introduce L6 | Read Ch 7.1, 7.2, 7.4, 7.5 |
| F 4/24 |  | Discuss NN Lecture in small groups (outlook/teams) | Quiz 5 |
| 7 | T 4/28 | Training NN | Optional Lab 6 Q&A | Lab 6 |
| R 4/30 |  | Discuss NN Training Lecture in small groups, Introduce L7 | Read <https://page.mi.fu-berlin.de/rojas/neural/chapter/K7.pdf> |
| F 5/1 |  | Final Project Introduction | Quiz 6 |
| 8 | T 5/5 | RL, MDP, Q-Learning | Optional Final Project Q&A | Lab 7 |
| R 5/7 |  | Final Project Status Updates (everyone), Introduce L8 | Read Ch 12.1, 12.4 |
| F 5/8 |  | Discuss RL, MDP, Q-Learning Lecture (outlook/teams) | Quiz 7 |
| 9 | T 5/12 | Genetic Algorithms | Optional Final Project Q&A | Lab 8 |
| R 5/14 |  | Final Project Work Time | Read Ch 4.8 |
| F 5/15 |  | Discuss Genetic Algorithm Lecture (outlook/teams) | Quiz 8 |
| 10 | T 5/19 |  | Final Exam Review |  |
| R 5/21 |  | Final Project Presentations | Final Project Code |
| F 5/22 |  | Final Exam |  |