Course Syllabus

CS 465, CS 565 - Introduction to Artificial Intelligence

[Fall 2024]

Course Information

Instructor: Shiqi Zhang
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Office: N12, Engineering Building
Office hours: Tuesdays, 10--12 PM or by appointment

Class Time

Tuesdays and Thursdays 02:50 PM - 04:15 PM
Location: University Union 209
Start Date: 08/20/2024
End Date: 12/05/2024

TAs

Name: Yohei Hayamizu (TA)
Office hours: Wednesdays 2-4pm
Location: EB N00 (by default) or https://binghamton.zoom.us/j/2421759863
Email: yhayami1@bing…

Name: Zainab Altaweel (TA)
Office hours: Thursdays 12:30-2:30pm
Location: EB N00 (by default) or on Zoom
Email: zaltaweel@binghamton.edu

Course Description

This course will cover the ideas and techniques underlying the design of artificial intelligence (AI) agents, including advanced AI topics on knowledge representation, reasoning, learning, and planning. There is no generally accepted definition of "artificial intelligence." Some that have been proposed include:

- The science of getting computers to do the things they can't do yet.
- Finding fast algorithms for NP-hard problems.
- Getting computers to do the things they do in the movies.

Credit and Contact Hours

Credit Hours: 3 for graduate students, 4 for undergraduate students

- Contact hours: 3
- In addition to the scheduled meeting times, students are expected to do at least 6 hours of course-related work outside of class each week during the semester. This includes time spent completing assigned readings, participating in lab sessions, studying for tests and examinations, preparing written assignments, and other course-related tasks.

Learning Objectives

This course is designed to provide a solid foundation in artificial intelligence, getting students ready to work in the AI industry and pursuing a more advanced degree on AI or related topics. In particular, upon successful completion of this course, student outcomes include:

- Knowledge of key concepts of AI
- Programming experience with Python, as applied to AI algorithms
- Knowledge of search, knowledge representation, reasoning under uncertainty, machine learning, and applications

Textbooks and Other Materials

Artificial Intelligence: A Modern Approach (3rd Edition with Blue cover)

By Russell and Norvig

Publisher: Pearson

Topics/Class Schedule

The following topics will be covered:

Topics	
01	Intro to AI
02	Uninformed search
03	A* Search and Heuristics
04	Constraint satisfaction problems
06	Knowledge representation and reasoning
07	Game Trees
08	Markov Models, Markov decision processes
09	Reinforcement learning
11	Hidden Markov models
12	Bayes' networks
18	Naive Bayes
19	Perceptrons, Kernels and Clustering

Lecture Notes and Supplemental Materials

- Lecture Notes for each chapter, in PDF format, as well as some relevant supplemental materials will be posted online.
- Additional materials will be added as appropriate.

Assignments

- There will be four Python programming projects in which you will implement AI algorithms. Students can work on projects individually, or in two-student teams. Students will upload solutions onto Brightspace.
- There will be four homeworks assigned throughout the whole semester. Students will upload solutions onto Brightspace.

Important notes about assignments

- Each student is allowed 4 "late" days in total for all programming assignments throughout the semester. For each assignment, each team (up to 2 students) can use up to 2 days (48 hours). Students who have used up the "late" days are not allowed to upload solutions after the deadlines, in person or in teams.
- Programs and the project. Please make an effort to make your programs easy to understand and grade. Grading all assignments in this course is very time consuming! All programming assignments should have:
  1. For the program:
     - A general explanation of the design, and why it is correct.
     - The classes used and their interaction.
     - The code should also be well commented.
  2. For each class in your program
     - An explanation of the purpose of the class, and the methods it includes.
  3. For each method (function)
     - A description of the purpose of each function and an explanation of how it works.
     - A description of the purpose, and the assumptions made about each parameter of a function.
     - A comment for every variable declaration.
- Collaboration on Assignments. Students are encouraged to help one another and to form study groups. In Computer Science, you can often learn more from your peers than from your instructors and teaching assistants. As long as the help is appropriate, please be generous with your time and expertise when helping fellow students. Doing so is good for you and good for them. You are free to discuss assignments in general terms with one another. However, please do not show your work directly to other students. Each student must complete your assignments individually (unless indicated otherwise by the instructor, such as team projects). Each of you must write your own code, and you must write up all solutions individually. Students submitting solutions (including code) that are

determined to be "too similar" are likely to be punished equally and harshly. We can tell whether you have done the work on your own, so please do the work on your own.

- Grading disputes, regarding missing grades.
    - In this course, we commonly give partial credit to partially correct answers. Should you dispute a partial credit, please be aware that we will not re-grade a single question in an assignment or an exam. ALL partial credits of the work will be re-examined. The new grade may be higher, lower, or stay the same. This new grade will not be changed.
    - The scores of your assignments will be posted on Brightspace after the assignments are graded. Please check your status on Brightspace periodically and make sure that there are no missing grades or errors. A missing grade at the end of the semester will indicate that the work has NOT been done.

Method of Assessment

The following percentage weights will be used to assess student work:

- Class participation: 5%
- Programming Projects: 20%
- Homework Assignments: 30%
- Midterm: 20%
- Final: 25%

Grading

Your final grade for this course is largely based on your performance relative to the performance of other students in the class. As a reference, the approximate breakdown of grades from a previous class is: above 90, A; above 85: A-; above 80, B+; above 75, B; above 70, B-; above 67, C+; above 64, C; above 60, C-; above 55, D; below 55, F.

Academic Honesty Expectations and Violation Penalty

- Computer science faculty at Binghamton wrote a letter to all computer science students about the importance of academic honesty. This letter is available from this course's Brightspace account.
- Please review the academic honesty document and make sure that you understand it! The link is at: http://www.binghamton.edu/watson/about/honesty-policy.pdf
- For this course, programming assignments (projects) are all team projects. In addition, certain open-source tools/software are permitted to be used (see the description of each project for details). Used open-source tools/software must be clearly acknowledged in the submitted project report.

Managing Stress

If you are experiencing undue personal or academic stress at any time during the semester or need to talk with someone about a personal problem or situation, I encourage you to seek support as soon as possible. I am available to talk with you about stresses related to your work in my class. Additionally, a wide range of campus resources is available to provide help, including:

- Dean of Students Office: 607-777-2804
- University Counseling Center: 607-777-2772
- Interpersonal Violence Prevention: 607-777-3062
- Office of International Student & Scholar Services: 607-777-2510

Covid-19 related safety requirements

For details, please refer to the University's Covid-19 Guidance for Fall 2022: https://www.binghamton.edu/covid-guidance/index.html The following is a summary of the key points of the guidance extracted on July 12, 2022, which is subject to change.

- All students who have a physical presence on campus are required to complete a primary series of COVID-19 vaccines (fully vaccinated*).
- The University no longer requires masking, except for individuals in healthcare facilities. However, the CDC continues to communicate that masks can protect you and others from COVID-19.

Watson College's policy about Use of Generative Artificial Intelligence

While generative Artificial Intelligence (AI) tools can support student learning and understanding, they can also bypass important student learning outcomes. To maintain a community of integrity and respect, the following principles must be observed:

- Without clear and explicit permission from the course instructor, using generative AI tools for any course assignment or exam (e.g., by entering exam or assignment questions) will be considered analogous to unauthorized collaboration and/or plagiarism.
- In courses that allow the use of generative AI, students should acknowledge and properly cite the use and default to disclosing such assistance when in doubt.

Individual course instructors are free to set their own expectations for the use of generative AI tools in their courses and to articulate those policies in course syllabi and in class. Students who are unsure of policies regarding generative AI tools are encouraged to ask their instructors for clarification.

Watson's Student Academic Honesty Code page:

https://www.binghamton.edu/watson/about/academic-honesty.html

- Watson's policy requires that a report of Category 1 dishonesty be filed for any student who admits to and is penalized for academic dishonesty. If the instructor handles it themselves without reporting, students who commit multiple violations will not be identified and dealt with accordingly.
- Reports of category 1 violations must be submitted as soon as the student signs the form. This is important to quickly catch repeat offenders.

- Students can easily deny using AI to complete writing and coding assignments, since AI checkers have non-zero false positive rates. Instructors should consider this when designing their assessment tools.