

CSE-4633-6633 Artificial Intelligence (Spring 2024)

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CSE 4633 / 6633 Artificial Intelligence

Time: Tuesday and Thursday, 3:30pm - 4:45 pm

Room: MCCAIN 100

Office Hours:

In-person: Tuesday and Wednesday, 2:15 pm - 3:15 pm in Butler Hall 314

Virtual: Tuesday 1:15pm - 2:15pm on WebEx

<https://msstate.webex.com/meet/jdc1258>

Other times by email appointment.

Instructor: Jingdao Chen, chenjingdao@cse.msstate.edu

Teaching Assistant: TBA

Course Description and Learning Objectives

This course covers the theory and practice of Artificial Intelligence (AI). Many industrial, civil, medical, financial, robotic, and information systems make use of AI problem-solving methodologies. We will look into how AI systems represent knowledge, develop action sequences, and search for optimal or near-optimal solutions. We will explore how computers can describe data and make intelligent decisions to achieve goals. We will also look at how to deal with uncertainty and how to learn from mistakes. Throughout the course, we will examine AI and Ethics, as well as AI for Social Good applications. Learning objectives for this course include comprehending the computational foundations of AI, how probability and AI are intertwined, and how automated agents make judgments. Students can also expect to achieve a big picture understanding of how to create autonomous intelligent entities.

Grading

- 5% Participation
- 15% Quizzes
- 10% In-class programming assignments
- 50% Lab assignments
- 20% Group Project
 - 5% Project Proposal
 - 15% Final Presentation

Grading Scale:

A = 90 – 100 %

B = 80 – 89.9 %

C = 70 – 70.9 %

D = 60 – 69.9 %

F = Below 60 %

Tentative Course Schedule

**Note that this is a tentative schedule subject to changes.*

Index	Date	Lecture	Textbook	Due
1	Jan 16	Course Intro	Jupyter notebook tutorial	

[Links to an external site.](#)

[Google Colab Tutorial](#)

Links to an external site.				
2	Jan 18	Problem Solving and Search: Depth-first Search, Breadth-first Search	Chapter 3	Lab 0 released

3	Jan 23	Problem Solving and Search: Word Ladder, Uniform-cost Search	Chapter 3	In-class exercise 1 Word Ladder
4	Jan 25	Problem Solving and Search: Completeness, optimality, time/space complexity	Chapter 3	
5	Jan 30	Problem Solving and Search: Iterative Deepening	Chapter 3	
6	Feb 1	Problem Solving and Search: Local search, stochastic search	Chapter 4	Lab 1 released
7	Feb 6	Problem Solving and Search: Beam search, simulated annealing	Chapter 4	
8	Feb 8	Problem Solving and Search: Constraint satisfaction problems	Chapter 6	Quiz 1 due
9	Feb 13	Problem Solving and Search: Constraint satisfaction problems	Chapter 6	
10	Feb 15	Problem Solving and Search: Constraint satisfaction problems	Chapter 6	Lab 1 due
11	Feb 20	Game Playing: Minimax	Chapter 5	Lab 2 released Lab 2 groups signup sheet
Links to an external site.				
12	Feb 22	Game Playing: Evaluation functions	Chapter 5	

13	Feb 27	Game Playing: Alpha-beta pruning	Chapter 5	
14	Feb 29	Game Playing: Monte-Carlo Tree Search	Chapter 5	
15	Mar 5	Natural Language Processing: Language Models	Chapter 22	<u>Project signup sheet</u>
<u>Links to an external site.</u>				
Quiz 2 due				
16	Mar 7	Natural Language Processing: Bayes Nets, Markov Chains	Chapter 15	In-class exercise (Markov Chain Text-Generator)
17	Mar 12	Spring break: no class		Project Proposal due
18	Mar 14	Spring break: no class		
19	Mar 19	Natural Language Processing: Word embeddings	Chapter 22	Battlesnake Trials
20	Mar 21	Natural Language Processing: Transformers	Chapter 22	
21	Mar 26	Computer Vision: Image Representations	Chapter 24	Battlesnake Competition Lab 3 released
22	Mar 28	Computer Vision: Bayes Rule, Bayes Classifier	Chapter 13	
23	Apr 2	Computer Vision: Image Features	Chapter 13	
24	Apr 4	Computer Vision: Convolutional Neural Networks	Chapter 24	

			PyTorch tutorial	
Links to an external site.				
25	Apr 9	Computer Vision: Segmentation	Chapter 24	<i>In-class exercise (Point Cloud Semantic Segmentation)</i>
26	Apr 11	Computer Vision: Generative Adversarial Networks	Chapter 24	<i>Quiz 3 due</i>
27	Apr 16	Ethical AI: Explainability		
28	Apr 18	Ethical AI: Cybersecurity		
29	Apr 23	Project Presentation #1		Lab 3 due
30	Apr 25	Project Presentation #2		
31	May 9 (3 - 5pm)	(final exam date) Project Presentation #3		Final Report (presentation slides) due

Textbook

Artificial Intelligence: A Modern Approach, 4th Edition, by Stuart Russell and Peter Norvig

<http://aima.cs.berkeley.edu/>

Lab Assignments

Three lab assignments that involve Python programming will be given throughout the semester and is an essential part of understanding concepts in Artificial Intelligence. The assignment should be submitted by the specified due date by the end of the day. Assignments will be graded

and returned. Students are responsible for assignments turned in on time; even for days when the student has an excused absence.

Unless otherwise specified, assignments will be done individually and each student must hand in their own assignment. It is acceptable, however, for students to collaborate in figuring out solutions and helping each other understand the underlying concepts. When collaborating, the "whiteboard policy" is in effect: You may discuss assignments on a whiteboard, but, at the end of a discussion the whiteboard must be erased, and you must not transcribe or take with you anything that has been written on the board during your discussion. You must be able to reproduce the results solely on your own after any such discussion. Finally, you must report the names of the students you collaborated with on each assignment.

Late Submission Policy

[Links to an external site.](#)

Late assignments will lose 10% per day late (including weekend days), up to a maximum of 50% off.

Quizzes

Quizzes represent an opportunity for students to test their understanding and have some indication of their class standing by mid-semester. Quizzes will be open-book and administered through Canvas. The quizzes will consist of multiple-choice questions and will cover material given in the lecture slides, assigned readings, notes, lab assignments, guest lectures, and/or projects. Students may select any 30 minute period within the given one-week period on Canvas to attempt the Quiz.

Graduate Students

Students taking this class for graduate credit have the additional requirement that they need to complete at least **one** extra credit problem in each lab assignment that has extra credit problems available. Failure to complete this requirement will result in 5% off the grade for individual lab assignments.

Distance Students

Video recordings will be provided for distance students to view the lecture sessions asynchronously. Distance students will need to complete labs and quizzes the same way as non-distance students, i.e., submitting them before the deadline via Canvas. Take-home quizzes will not use remote proctoring services such as Honorlock, but all the students must follow Mississippi State University Honor Code. Distance students are allowed to complete the group project presentation remotely. The Participation grade will be assigned based on active participation in posting relevant comments, questions, and answers about the lectures on Canvas Discussions. The in-class programming sessions will be recorded for the benefit of distance students; asynchronous distance students also have the option of joining the live WebEx sessions to follow along, interact and ask questions. In addition, virtual office hours will be held by the instructor every week to enable distance students to get help on their assignments and projects.

Continuity of Instruction

In the event that face-to-face classes are suspended due to extenuating circumstances, such as weather, the instructor will continue instruction in a manner that best supports the course content and student engagement. In this event, all instructors will notify students of the change via their university email address (the official vehicle for communication with students). At that time, they will provide details about how instruction and communication will continue, how academic integrity will be ensured, and what students may expect during the time that face-to-face classes are suspended. If a student becomes unable to continue class participation due to extenuating circumstances, (e.g., health and safety, loss of power, etc.) the student should contact their instructor and advisor for guidance. For additional guidance, please refer to [Academic Operating Policy 12.09](#).

Attendance policy

For on-campus students, this section is a face-to-face instructional class. Students are expected to attend class regularly and to arrive on time. Although class attendance is mandatory, up to **two** absences are allowed during the semester. Sleeping in class, being late, or leaving early without prior notice may result in an unexcused absence. Please refer to [Academic Operating Policy 12.09](#), regarding attendance expectations and accommodations.

University syllabus: The Mississippi State University Syllabus contains all policies and procedures that are applicable to every course on campus and online. The policies in the University Syllabus describe the official policies of the University and will take precedence over those found elsewhere. It is the student's responsibility to read and be familiar with every policy. The University Syllabus may be accessed at any time on the Provost website under Faculty and Student Resources and at <https://www.provost.msstate.edu/faculty-student-resources/university-syllabus>

Acknowledgements

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