

University of South Carolina
College of Engineering and Computing
CSCE 580: Artificial Intelligence
Spring 2024

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	Class Time: T,TH 4:25pm-5:40pm
	Class Location: Innovation (550 Assembly Street) Room 1400

Course Description

This course will cover what intelligent agents are and how to design them. By the end of this class, you should be able to build intelligent agents to solve problems, reason in cases of both certainty and uncertainty, learn from supervision, learn from independent experience, and learn without supervision.

Prerequisites

CSCE 350 is the official prerequisite.

You should be a proficient programmer. Programming assignments will be in Python. If you do not know Python, it will be expected that you learn it independently and rapidly.

Learning Outcomes

Students who take this class will learn to:

- Analyze and understand artificially intelligent agents
- Understand and utilize search algorithms to solve problems involving pathfinding, optimization, constraint satisfaction, and game playing
- Represent domain knowledge and reason about this knowledge using propositional logic and first-order logic
- Reason under uncertainty using Bayesian networks
- Understand and utilize supervised learning methods, including logistic regression, decision trees, and deep neural networks
- Understand and utilize reinforcement learning methods, including value iteration and Q-learning
- Understand and utilize unsupervised learning methods, including k-means and autoencoders

The learning outcomes of this class are equivalent to those of a face-to-face version of the course.

Required Textbooks

There are no required textbooks, however, much of the course material will draw from:

- Artificial Intelligence: A Modern Approach
- Reinforcement Learning: An Introduction

All reading materials comply with copyright/fair use policies.

Course Overview

All required material for the class will be online. The class will consist of in person lectures. The instructor, along with the students, will be able to help each other with conceptual questions through Piazza.

The expected turnaround time for discussion board postings and communication via email is one business day. The expected turnaround time for homework assignments is one week. Students are encouraged to attend the weekly office hours to ask questions and get feedback on ideas.

Piazza

All class-related discussion will be conducted through Piazza. You to ask questions when you're struggling to understand a concept and can even do so anonymously. To ensure everyone turns in their own work, do not post code or solutions (or partially completed solutions) to written homework assignments on Piazza.

Technology

Students will be given an Anaconda environment that contains all the Python packages needed to complete the homework assignments. Students should be familiar with unix and be experienced programmers.

Homework

Homework will consist of written homeworks and coding homework. The lowest homework score will be dropped.

The written homework will consist of conceptual problems to ensure you understand the theoretical aspects of artificial intelligence. **In order to receive credit on written homework questions your answers must be legible.**

Coding homework will consist of programming exercises to ensure you are able to implement artificial intelligence algorithms. Grading will be based on the behavior of the code and not on how close the implementation is to a correct implementation. **Therefore, in order to receive credit on coding homework questions, your code must run.**

Exams

Exams will be in class. Seats will be assigned.

Late Work

Any homework turned in after the assigned deadline will be marked late regardless of how close to the deadline it may be. Homework can be turned in a maximum of 1 day late with a penalty of 20 percentage points. Students should aim to submit their homework early in order to avoid any last minute issues. Students are allowed to submit their homework multiple times and the more recent submission will be used for grading.

Grading

Grades will be determined on the following scale:

A	[90 – 100]
B+	[83 – 90)
B	[75 – 83)
C+	[68 – 75)
C	[60 – 68)
D+	[53 – 60)
D	[45 – 53)
F	[0 – 45)

The grading breakdown will be different for undergraduate and graduate students.

Undergraduate

Homework	60%
Midterm Exam	20%
Final Exam	20%

Graduate

Graduate students will be given an additional assignment involving an advanced topic.

Homework	50%
Graduate Project	10%
Midterm Exam	20%
Final Exam	20%

Incomplete

A grade of Incomplete (“I”) is only given in extreme cases when a student is unable to complete some portion of the assigned course work because of a significant incident. These may include an unanticipated illness, accident, work-related responsibility, family hardship, or verified learning disability. An incomplete will only account for 20% of the overall course grade, and it only applies to work after the reported incident. In addition, a student must be in good grade standing, a “C” or greater, at the time of the incident to qualify.

Course Schedule

Week 1: Uninformed and informed search

Week 2: Local search and constraint satisfaction

Week 3: Adversarial search

Week 4: Propositional logic

Week 5: First order logic

Week 6: Prolog

Week 7: Probability

Week 8: Midterm

Week 9: Bayesian Networks

Week 10: Linear Models

Week 11: Neural networks

Week 12: Deep neural networks

Week 13: Reinforcement learning

Week 14: Reinforcement learning

Week 15: Unsupervised learning

Attendance Policy

Attendance is an essential part of this class as asking questions, discussing lecture material, and proposing new ideas will be greatly enhance your learning experience.

Request for Accommodations

If you are a student with a disability and require accommodation to participate, notify me immediately and contact the Student Disability Resource Center (<http://www.sa.sc.edu/sds>, 1705 College Street, Close-Hipp, Suite 102 Columbia, SC 29208, 803-777-6142, sadrc@mailbox.sc.edu) for verification of eligibility and determination of specific accommodations. In addition, please provide me the required accommodation letter from the Student Disability Resource Center.

Academic Integrity

All work turned in must be your own. Plagiarism of any kind, including from online sources, is strictly prohibited. All potential Honor Code violations will be reported to the Office of Academic Integrity. Honor Code violations of any kind (including plagiarism) on the homework assignments will result in a zero on that assignment. Furthermore, students who have plagiarized a homework assignment will not be able to drop their lowest grade. Honor Code violations of any kind (including plagiarism) on the midterm or final will result in failure of the course. You can familiarize yourself with the Honor Code here: <http://www.sc.edu/policies/ppm/staf625.pdf>.

Student Interaction

- Student-to-Instructor: There will be weekly face-to-face sessions held for synchronous instruction. There will be weekly office hours.
- Student-to-Student: Students will be able to interact with each other on Piazza and during synchronous sessions.
- Student-to-Content: Students will have access to the slides.

Health and Safety

Students are expected to comply with all university health and safety guidelines including those about COVID-19. For current COVID-19 guidelines, visit https://sc.edu/safety/coronavirus/safety_guidelines.

Syllabus Change Policy

This syllabus is a guide and every attempt is made to provide an accurate overview of the course. However, circumstances and events may make it necessary for the instructor to modify the syllabus during the semester and may depend, in part, on the progress, needs, and experiences of the students. Changes to the syllabus will be made with advance notice.