



**COURSE TITLE/SECTION:** Fundamentals of Artificial Intelligence (COSC 4368) *March 31, 2023*

**TIME:** MW 2:30-4p

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## **Course Fundamentals of Artificial Intelligence (COSC 4368)**

Course Webpage: [COSC 4368: Fundamentals of Artificial Intelligence Programming \(uh.edu\)](https://www.uh.edu/~ceick/COSC4368/)

### **A. Catalog Description**

*Prerequisite:* COSC 2320 or COSC 2430.

*Description:* An overview of main topics in the field of artificial intelligence. Topics include search techniques, reasoning with logic, planning, decision making, machine learning, and robotics.

### **B. Purpose**

This course introduces students to the basic knowledge representation, problem solving, reasoning, and learning methods of artificial intelligence. Upon completion COSC 4368 students should be able to develop intelligent systems by assembling solutions to concrete computational problems; understand the role of knowledge representation, problem solving, and learning in intelligent-system engineering and appreciate the role of problem solving, learning and reasoning in understanding human intelligence from a computational perspective. In particular students will get exposure to the following themes:

- More general themes:
  - Search algorithms
  - Probabilistic reasoning
  - Making sense out of data/data science
- AI-specific Topics:
  - Heuristic search, constraint satisfaction problems, and games
  - Learning from examples and reinforcement learning
  - Evolutionary computing
  - game theory
  - Reasoning in uncertain environments and belief networks
  - Ethics and societal aspects of AI
  - Planning
- Exposure to AI tools (belief networks, neural networks, autoencoders, support vector machines)

### **C. Course Objectives**

Upon completion of this course, students

1. will know what the goals and objectives of artificial intelligence are
2. will have a basic understanding and obtain practical experience on how to build real-world intelligent systems
3. will have sound knowledge of popular classification and prediction techniques, such as artificial neural networks and support vector machines.
4. will learn how to build systems that explore and act in unknown and changing environments intelligently
5. will sound knowledge of popular search algorithms and heuristic search
6. will have a basic understanding of approaches to reason in uncertain environments including Naïve Bayes, Belief Networks, and Hidden Markov Models.
7. will get some exposure to the ethical and societal problems associated with developing, deploying and using AI systems
8. will get some exposure to logical reasoning, planning, evolutionary computing and game theory, and deep learning.

### **D. Course Content**

- I. Introduction to Artificial Intelligence
- II. Problem Solving, Search and Games
- III. Evolutionary Computing
- IV. Game Theory
- V. Reinforcement Learning
- VI. Supervised Learning
- VII. Deep Learning
- VIII. Decision Making and Reasoning in Uncertain Environments
- IX. Ethical and Societal Aspects of AI
- X. Logical Reasoning and Planning

## **E. Course Elements**

Course Delivery Mode: Face to Face but lectures will be streamed on MS Teams.

23 lectures

2 exams

1 7-week long group project

1 group homework credit presentation (groups present solutions of homework-style problems during the lecture)

3 problem sets (containing implementation tasks, and task which use AI tools)

2 review sessions before the course exams (35 minutes each)

The group project will center on reinforcement learning; the 3 Problem Sets will center on:

Problem Set 1: Search

Problem Set 2: Support Vector Machines, Neural Networks and AutoEncoders

Problem Set3: Probabilistic Reasoning, Belief Networks and Societal Aspects of AI

## **F. Lecture Attendance Policies**

Lecture attendance will be taken in February, March and April 2023. Attendance counts 3% towards the overall course grade for the Spring 2022 teaching of the course. You can attend lectures F2F or remotely via MS Teams; however, you have to attend at least 3 F2F lectures in February, at least 2 F2F lectures in March and at least 3 F2F lectures in April 2022.

Moreover, you have to attend online lecture for at least 60 minutes in order to count towards your attendance. Your attendance score will be computed by counting the lectures you attended F2F or via MS Teams; however, if you attended less than minimum required F2F lectures for a particular month a penalty of -4 will be assessed on your attendance score for that month. In general, the UH Excused Absence Policy ([link can be found below](#)) applies to missing course lectures.

We have 22 lectures in February(8), March(6), and April(8) 2023. Your attendance number grade (the number grade scale we use in Spring 2022 can be found in the section below) will be computed by converting your attendance score as follows:

22:94, 21:93, 20:92, 19:91, 18:88, 17:85, 16:82, ..., 9:61, 8:58, 7:55, 6:52, 5:49, 4 or below: 46.

## **G. Textbooks**

### **Recommended Text:**

S. Russell and P. Norvig, *Artificial Intelligence, A Modern Approach*, Fourth Edition, Prentice Hall/Allyn&Bacon, 2021.

## H. Evaluation and Grading

Exams: 47% (Midterm Exam: 21%; Final Exam: 26%)  
Problem Sets (Individual Tasks, about 30%) and Group Project(about 17%): 47%  
Attendance: 3%  
Group Homework Credit: 3%

Translation number to letter grades:  
A:100-92 A-:92-88 B+:88-84 B:84-80 B-:80-76 C+:76-71  
C: 71-66 C-:66-62 D+:62-58 D:58-54 D-:54-50 F: 50-0

Students may discuss course material and homeworks, but must take special care to discern the difference between **collaborating** in order to increase understanding of course materials and collaborating on the homework / course project itself. We encourage students to help each other understand course material to clarify the meaning of homework problems or to discuss problem-solving strategies, but it is **not** permissible for one student to help or be helped by another student in working through homework problems and in the course project. If, in discussing course materials and problems, students believe that their like-mindedness from such discussions could be construed as collaboration on their assignments, students must cite each other, briefly explaining the extent of their collaboration. Any assistance that is not given proper citation may be considered a violation of the Honor Code, and might result in obtaining a grade of F in the course, and in further prosecution.

**Policy on grades of I (Incomplete):** A grade of 'I' will only be given in extreme emergency situations and only if the student completed more than 2/3 of the course work.

**Addendum:** Whenever possible, and in accordance with 504/ADA guidelines, the University of Houston will attempt to provide reasonable academic accommodations to students who request and require them. Please call 713-743-5400 for more assistance.

## I. MS Team and Blackboard

A Microsoft team called 4368-Class will be used for the teaching of the course: namely, for course discussions, submitting problem set tasks, as a discussion forum for the class. Blackboard will be also used; likely for posting of grades and maybe for other matters.

## J. COVID-19

If you are experiencing any COVID-19 symptoms that are not clearly related to a pre-existing medical condition, do not come to class. Please see [Student Protocols](#) for what to do if you experience symptoms and [Potential Exposure to Coronavirus](#) for what to do if you have potentially been exposed to COVID-19. Consult the [Graduate Excused Absence Policy](#) for information regarding excused absences due to medical reasons.

## **K. Course Exams**

Course exams will be paper exams which you take in a UH classroom, likely our assigned classroom. If you are experiencing any COVID-19 symptoms that are not clearly related to a pre-existing medical condition, do not come to the exam. Please see [Student Protocols](#) for what to do if you experience symptoms and [Potential Exposure to Coronavirus](#) for what to do if you have potentially been exposed to COVID-19. Consult the [\(Graduate Excused Absence Policy\)](#) for information regarding excused absences due to medical reasons.

Moreover, if you miss a course exam for reasons that are not covered by the Undergraduate Excused Absence Policy you will get a grade of 'F' for the missed exam.

## **L. COVID-19 Information**

Students are encouraged to visit the University's [COVID-19](#) website for important information including diagnosis and symptom protocols, on-campus testing, and vaccine information. Please check the website throughout the semester for updates.

## **M. Vaccinations**

Data suggests that vaccination remains the best intervention for reliable protection against COVID-19. Students are asked to familiarize themselves with pertinent [vaccine information](#) and to consult with their health care provider. The University strongly encourages all students, faculty and staff to be vaccinated.

## **N. Reasonable Academic Adjustments/Auxiliary Aids**

The University of Houston complies with Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1990, pertaining to the provision of reasonable academic adjustments/auxiliary aids for disabled students. In accordance with Section 504 and ADA guidelines, UH strives to provide reasonable academic adjustments/auxiliary aids to students who request and require them. If you believe that you have a disability requiring an academic adjustments/auxiliary aid, please contact [the Justin Dart Jr. Student Accessibility Center](#) (formerly the Justin Dart, Jr. Center for Students with Disabilities).

## **O. Excused Absence Policy**

Regular class attendance, participation, and engagement in coursework are important contributors to student success. Absences may be excused as provided in the University of Houston [Undergraduate Excused Absence Policy](#) and [Graduate Excused Absence Policy](#) for reasons including: medical illness of student or close relative, death of a close family member, legal or government proceeding that a student is obligated to attend, recognized professional and educational activities where the student is presenting, and University-sponsored activity or athletic competition. Under these policies, students with excused absences will be provided with an opportunity to make up any quiz, exam or other work that contributes to the course grade or a satisfactory alternative. Please read the full policy for details regarding reasons for excused absences, the approval process, and extended absences. Additional policies address absences related to [military service](#), [religious holy days](#), [pregnancy and related conditions](#), and [disability](#).

## **P. Recording of Class**

Students may not record all or parts of class, livestream all or part of class, or make/distribute screen captures, without advanced written consent of the instructor. If you have or think you may have a disability such that you need to record class-related activities, please contact the [Justin Dart, Jr. Student](#)

**Accessibility Center**. If you have an accommodation to record class-related activities, those recordings may not be shared with any other student, whether in this course or not, or with any other person or on any other platform. Classes may be recorded by the instructor. Students may use instructor's recordings for their own studying and notetaking. Instructor's recordings are not authorized to be shared with *anyone* without the prior written approval of the instructor. Failure to comply with requirements regarding recordings will result in a disciplinary referral to the Dean of Students Office and may result in disciplinary action.

## **Q. Syllabus Changes**

Please note that the instructor may need to make modifications to the course syllabus and may do so at any time. Such changes will be shared with students in the News Section of the course webpage.

## **R. Resources for Online Learning**

The University of Houston is committed to student success, and provides information to optimize the online learning experience through our **Power-On** website. Please visit this website for a comprehensive set of resources, tools, and tips including: obtaining access to the internet, AccessUH, and Blackboard; requesting a laptop through the Laptop Loaner Program; using your smartphone as a webcam; and x If you are experiencing any COVID-19 symptoms that are not clearly related to a pre-existing medical condition, do not come to class. Please see **Student Protocols** for what to do if you experience symptoms and **Potential Exposure to Coronavirus** for what to do if you have potentially been exposed to COVID-19. Consult the (select: **Undergraduate Excused Absence Policy** or **Graduate Excused Absence Policy**) for information regarding excused absences due to medical reasons.

## **S. UH Email**

Please check and use your Cougarnet email for communications related to this course. You will also need your Cougarnet account to access the Course MS Teams page 3337-Class and for listening to course lecture. To access this email, **login** to your Microsoft 365 account with your Cougarnet credentials. Your Cougarnet Account also allows you to download Microsoft Office 365 at no cost. For questions or assistance contact **UHOnline@uh.edu**.

## **T. Academic Honesty Policy**

High ethical standards are critical to the integrity of any institution, and bear directly on the ultimate value of conferred degrees. All UH community members are expected to contribute to an atmosphere of the highest possible ethical standards. Maintaining such an atmosphere requires that any instances of academic dishonesty be recognized and addressed. The **UH Academic Honesty Policy** is designed to handle those instances with fairness to all parties involved: the students, the instructors, and the University itself. All students and faculty of the University of Houston are responsible for being familiar with this policy.

## **U. Title IX/Sexual Misconduct**

Per the UHS Sexual Misconduct Policy, your instructor is a "responsible employee" for reporting purposes under Title IX regulations and state law and must report incidents of sexual misconduct (sexual harassment, non-consensual sexual contact, sexual assault, sexual exploitation, sexual intimidation, intimate partner violence, or stalking) about which they become aware to the Title IX office. Please know there are places on campus where you can make a report in confidence. You can find more information about resources on the Title IX website at **<https://uh.edu/equal-opportunity/title-ix-sexual-misconduct/resources/>**.

### Security Escorts and Cougar Ride

UHPD continually works with the University community to make the campus a safe place to learn, work, and live. Our Security escort service is designed for the community members who have safety concerns and would like to have a Security Officer walk with them, for their safety, as they make their way across campus. Based on availability either a UHPD Security Officer or Police Officer will escort students, faculty, and staff to locations beginning and ending on campus. If you feel that you need a Security Officer to walk with you for your safety please call [713-743-3333](tel:713-743-3333). Arrangements may be made for special needs.

Parking and Transportation Services also offers a late-night, on-demand shuttle service called Cougar Ride that provides rides to and from all on-campus shuttle stops, as well as the MD Anderson Library, Cougar Village/Moody Towers and the UH Technology Bridge. Rides can be requested through the UH Go app. Days and hours of operation can be found at <https://uh.edu/af-university-services/parking/cougar-ride/>.

### **V. Other Helpful Links**

**Coogs Care:** <https://uh.edu/dsa/coogscare/>

**Student Health Center:** <https://www.uh.edu/healthcenter/>