Course Syllabus

Course Information
(course number, course title, term, any specific section title)

Course number: CS 4365.004

Course title: Artificial Intelligence

Term: Spring 2025

Professor Contact Information
(Professor's name, phone number, email, office location, office hours, other information) (state time/day and how office hours will be held, e.g., physical office, BlackBoard Collaborate or MS Teams (add appropriate links) and/or phone call – optional; please ensure student's identity in adherence to FERPA)

Professor's Name: Vlad Bîrsan

Email: vib220000@utdallas.edu

Office Location: ECSS 4.215

Office Hours: Tuesdays and Thursdays, 5:30-6:30 PM upon request

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Course Pre-requisites, Co-requisites, and/or Other Restrictions
(including required prior knowledge or skills)

CS3345 (Data Structures and Introduction to Algorithmic Analysis)

Course Description

This course introduces the theoretical and computational techniques that serve as a foundation for the study of artificial intelligence (AI). Topics to be covered include:

1. **Introduction to AI and background**: What is AI? Related fields
2. **Problem-solving by search**: principles of search, uninformed ('blind') search, informed ('heuristic') search, genetic algorithms, adversarial search
3. **Knowledge representation and reasoning**: knowledge bases; logical and probabilistic inference; constraint satisfaction, planning, theorem-proving
4. **Game theory**: games with hidden information, non-zero-sum games

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Student Learning Objectives/Outcomes

Understand and use the following concepts in artificial intelligence:

1. Uninformed and heuristic search techniques
2. Local search algorithms
3. Constraint satisfaction problems
4. Logical inference using the resolution algorithm
5. Probabilistic inference in Bayesian networks
6. Planning
7. Games with perfect information (adversarial search)
8. Zero-sum games with hidden information
9. Non-zero-sum games with hidden information

Required Textbooks and Materials

No required textbook. Lecture slides will be available on the course website.

Suggested Course Materials

Artificial Intelligence: A Modern Approach by Stuart Russell and Peter Norvig, Prentice Hall, Inc., second or third edition.

Assignments & Academic Calendar

(Topics, Reading Assignments, Due Dates, Exam Dates)

WEEK/DATES	TOPIC/LECTURE
01/21	Administrivia, course overview
01/23	Uninformed search 1: DFS, BFS, Python basics*
01/28	Uninformed search 2: uniform-cost search, iterative deepening, Python basics*
01/30	Heuristic search 1: greedy best-first search
02/04	Heuristic search 2: admissible heuristics, A*
02/06	Local search 1: hill-climbing search, Davis-Putnam, simulated annealing
02/11	Local search 2: GSAT, WalkSAT
02/13	Local search 3: genetic algorithms
02/18	Constraint satisfaction search 2: problem encoding
02/20	Constraint satisfaction search 1: basic constraint satisfaction algorithms
02/25	Adversarial search 1: minimax
02/27	Adversarial search 2: alpha-beta pruning

03/04	Assignment 1 Discussion, Midterm 1 Review
03/06	Midterm 1
03/11	Logical reasoning 1: knowledge representation
03/13	Logical reasoning 2: proof theory: soundness and completeness
03/18	Spring Break
03/20	Spring Break
03/25	Logical reasoning 3: inference in propositional logic
03/27	Logical reasoning 4: review of first-order logic, Midterm 1 Discussion
04/01	Probabilistic reasoning 1: review of probability theory
04/03	Probabilistic reasoning 2: conditional independence
04/08	Probabilistic reasoning 3: exact inference for Bayesian nets
04/10	Probabilistic reasoning 4: d-separation, naive Bayes reasoning
04/15	Assignment 3 Discussion, Midterm 2 Review
04/17	Midterm 2
04/22	Game theory 1: games with hidden information, pure and mixed strategies
04/24	Game theory 2: non-zero-sum games, Prisoner's dilemma
04/29	Game theory 3: Nash equilibrium, Tragedy of the Commons
05/01	Assignment 4 Discussion, Midterm 2 Discussion
05/06	Final Review

Grading Policy
(including percentages for assignments, grade scale, etc.)

Homework assignments: 40% of the course grade
Midterm 1: 15% of the course grade
Midterm 2: 15% of the course grade
Final exam: 30% of the course grade

Tentative Grade Scale
Out of a total of 100 points:

Grade	**Points Interval**
A+	97–100
A	93–96
A-	90–92
B+	87–89
B	83–86
B-	80–82

C+	77–79
C	73–76
C-	70–72
D+	67–69
D	63–66
D-	60–62
F	0–59

Course & Instructor Policies
(make-up exams, extra credit, late work, special assignments, class attendance, classroom citizenship, etc.)

Collaboration policy
Unless otherwise stated, you may work in groups of two people on the homework assignments. This gives you the opportunity to discuss homework problems with another student and to learn how to work in a group. Only one writeup needs to be turned in for each group, but both members of the group are expected to understand and be able to reproduce the solution. In principle, you may choose to work with a different person for each assignment, but it may be easier to partner with the same person in practice. Nevertheless, it is perfectly fine for you to work on the assignments individually.

Academic integrity policy
You are expected to maintain the utmost level of academic integrity in the course, in accordance with the academic integrity policy of the Board of Regents of the University of Texas System. In particular, (a) it is your responsibility to protect your work from unauthorized access, and (b) the work you submit is is expected to be your own. Academic dishonesty has no place in a university or anywhere else: it wastes our time and yours, and it is unfair to everyone else.

Late assignment policy
All problem sets must be turned in on the date specified. You will be given six ``free'' late days, which you can use to turn in your assignment late without penalty. Note, however, that no more than two free late days can be spent on each homework assignment. Note that free late days only allow you to submit your assignments late without any late penalty ***within the late submission period****, but they won't allow you to submit after 48 hours of the official due date. After you use up the free late days, your late submissions will be penalized as follows. Assignments turned in within 24 hours of the due date will receive 90% of its score. Assignments turned in within 48 hours of the due date will receive 70% of its score. Assignments more than 48 hours late will not be accepted.*

Test policy
You must take the midterms and the final exam on the dates specified in the course schedule. Make-up exams will only be possible if you have medical notes

that document your sickness or documentation that you have to be out of town on the date of an exam. No exceptions will be made.

Extra credit policy
In the past some students were worried about not being able to pass the course in the middle of the semester and asked if there was work that they could do to earn extra credit. The answer is no. If you experience difficulties with the course, you should talk to the instructor and/or the TA early in the semester.

Regrade policy
The course staff will grade your work carefully. However, questions about grading do occasionally arise. If so, first read the solutions. If questions persist, please see the grader of that problem (come to office hours or schedule an appointment). In the interests of smooth administration and to encourage you to look at your graded work soon after it is returned, regrade requests must be made within two weeks of when the work was returned. We reserve the rights to make regrade decisions "off-line" (i.e., not immediately at the time requested).

Missing grade policy
If you choose to work in a group of two, you will be responsible for putting both group members' names in your submission. If you forget to put your partner's name on your submission, s/he will receive a score of zero for that submission. No exceptions will be made.

Incomplete grade policy
Incomplete grade is possible only in the case of a documented serious medical emergency near the end of the semester.

Class Materials

The instructor may provide class materials that will be made available to all students registered for this class as they are intended to supplement the classroom experience. These materials may be downloaded during the course; however, these materials are for registered students' use only. Classroom materials may not be reproduced or shared with those not in class or uploaded to other online environments except to implement an approved AccessAbility Resource Center accommodation. Failure to comply with these University requirements is a violation of the Student Code of Conduct.

Class Attendance

The University’s attendance policy requirement is that individual faculty set their course attendance requirements. Regular and punctual class attendance is expected. Students who fail to attend class regularly are inviting scholastic difficulty. In some courses, instructors may have special attendance

requirements; these should be made known to students during the first week of classes.

Class Participation

Regular class participation is expected. Students who fail to participate in class regularly are inviting scholastic difficulty. A portion of the grade for this course is directly tied to your participation in this class. It also includes engaging in group or other activities during class that solicit your feedback on homework assignments, readings, or materials covered in the lectures (and/or labs). Class participation is documented by faculty. Successful participation is defined as consistently adhering to University requirements, as presented in this syllabus. Failure to comply with these University requirements is a violation of the Student Code of Conduct.

Class Recordings

Students are expected to follow appropriate University policies and maintain the security of passwords used to access recorded lectures. Unless the AccessAbility Resource Center has approved the student to record the instruction, students are expressly prohibited from recording any part of this course. Recordings may not be published, reproduced, or shared with those not in the class, or uploaded to other online environments except to implement an approved AccessAbility Resource Center accommodation. Failure to comply with these University requirements is a violation of the Student Code of Conduct.

The instructor may record meetings of this course. These recordings will be made available to all students registered for this class if the intent is to supplement the classroom experience. If the instructor or a UTD school/department/office plans any other uses for the recordings, consent of the students identifiable in the recordings is required prior to such use unless an exception is allowed by law.

Off-campus Instruction and Course Activities

(Below is a description of any travel and/or risk-related activity associated with this course.)

Comet Creed

This creed was voted on by the UT Dallas student body in 2014. It is a standard that Comets choose to live by and encourage others to do the same:

"As a Comet, I pledge honesty, integrity, and service in all that I do."

Accommodations for Students with Disabilities

Please review the section within the UT Dallas Syllabus Policies and Procedures webpage.

Academic Support Resources

Please visit the Academic Support Resources page to view the University's academic support resources for all students.

UT Dallas Syllabus Policies and Procedures

Please visit the Syllabus Policies page to view the University's policies and procedures segment of the course syllabus.

Please review the catalog sections regarding the credit/no credit or pass/fail grading option and withdrawal from class.

The descriptions and timelines contained in this syllabus are subject to change at the discretion of the Professor.