CS 370.H02: Introduction to Artificial Intelligence

Instructor: Shivvrat Arya
Email: shivvrat.arya@njit.edu
Office: GITC 4304
Semester: Spring 2026
TA: Anik Pramanik (ap2645@njit.edu)
How to submit assignments: Canvas

Time and Location

Tuesdays and Fridays, 2:30–3:50 PM

Cullimore Hall | Room 110

Office Hours: Tuesdays and Fridays, 1:30–2:30 p.m., or by appointment.

Discussion forum: We will be using Canvas.

Note: I will respond to all messages by the end of the following business day.

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 the following:

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; local search; genetic algorithms; adversarial search
3. **Knowledge Representation and Reasoning:** Knowledge bases; propositional logic; satisfiability; constraint satisfaction problems (CSPs); planning; logical and probabilistic inference
4. **Game Theory:** Games with hidden information; non-zero-sum games

Learning Outcomes

By the end of this course, students will be able to:

1. **Model and solve search problems** using uninformed and heuristic algorithms, and evaluate each algorithm's time/space complexity and optimality on a given problem formulation.
2. **Apply and evaluate local search algorithms to optimize objective functions**, reporting solution quality and convergence behavior.

3. **Formulate real-world tasks as CSPs** and **solve CSP instances** using backtracking, MRV /LCV heuristics, and arc consistency.
4. **Encode knowledge in propositional logic and SAT** and **derive conclusions by resolution**; when appropriate, **translate problems to SAT** and validate answers with solver outputs.
5. **Build Bayesian networks** and **perform exact and approximate inference**.
6. **Model sequential processes with HMMs** and interpret results in the context of uncertainty over time.
7. **Design adversarial agents for perfect-information games** using minimax and alpha–beta pruning and **analyze branching-factor impacts** on search performance.
8. **Reason about games with hidden information** (zero-sum and non-zero-sum).
9. **Apply foundational machine-learning methods** (supervised learning; regression/classification; clustering;) **to real-world datasets**, selecting metrics and **reporting performance with appropriate caveats about assumptions and data.**

Prerequisites

CS 114, MATH 337 (OR MATH/EssexCC 239), and CS 241 with a grade of C or better.

Course Textbooks and Resources

- **Textbook:** (*R&N*) Artificial Intelligence: A Modern Approach, Stuart Russell and Peter Norvig, Prentice Hall, Inc., Third edition.
- Selected papers and handouts.

Tentative Contents

R&N: Required Textbook by **Stuart Russell and Peter Norvig**

- Introduction [R&N, Chapter 1]
- Intelligent Agents [R&N, Chapter 2]
- Search [R&N, Chapter 3]
- Advanced Search Schemes [R&N, Chapter 4]
- Adversarial Search [R&N, Chapter 5]
- Constraint Satisfaction [R&N, Chapter 6]
- Propositional Logic [R&N, Chapter 7]
- Midterm 1
- Probability Theory review [R&N, Chapter 13]
- Probabilistic Reasoning [R&N, Chapter 14]
- Probabilistic Reasoning over Time [R&N, Chapter 15]
- Machine Learning [R&N, Chapter 18]
- Advanced Topics [TBD]
- Midterm 2

Tentative Grading Policy

Homework assignments and projects: 40% of the course grade
Midterm 1: 30% of the course grade
Midterm 2: 30% of the course grade
Class Participation and Attendance: Extra 5%

In addition, periodic pop quizzes will be administered throughout the semester. These quizzes are intended to reinforce key concepts and will provide opportunities to improve performance on examples, homework assignments, and projects by contributing positively to overall assessment outcomes.

Final letter grades will be determined by your overall percentage in the course, according to the scale below. At the end of the semester, small class-wide adjustments *may* be applied if an assessment proves unusually challenging or easy; however, any adjustments will be applied consistently to all students. The instructor reserves the right to change the scale as the need arises.

Letter Grade	Percentage Range
A	90–100
B+	85–89.99
B	80–84.99

Letter Grade	Percentage Range
C+	75–79.99
C	65–74.99
D	60-64.99
F	< 60

Responsiveness and Availability

Under normal conditions, emails will be answered within **48 hours**. To ensure prompt handling, all course-related emails must begin with the subject line: **"CS 370:"**

Assignments will typically be graded within **two weeks** of their due date.

Students are strongly encouraged to seek assistance as needed, whether through email or office hours. Responses to frequently asked questions will be shared via course announcements, please monitor them regularly.

Course & Instructor Policies

Make up exams: There will be no make-up exams

Extra credit: Some exam questions and homework questions will be assigned extra credit. They will be marked as extra credit.

Class attendance: Class attendance is mandatory. Getting to class late or leaving early counts as half an absence. If you have special circumstances that prevent you from attending class, you must provide documentation to the dean of students for your absence to be excused before the class. Participation in the discussion boards will earn you extra credit.

Class Participation: Active participation is an essential part of your learning in this course. This includes asking questions, answering questions, contributing to discussions, and engaging fully in in-class activities. To help create a focused and respectful learning environment, please silence and put away phones, laptops, and other devices during class unless we are using them for a specific activity. During class time, refrain from gaming, texting, emailing, browsing, or any other unrelated activities so that your attention, and our collective learning, remains on the course material.

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 must be out of town on the date of an exam. No exceptions will be made.

Regrade policy: The course staff will grade your work carefully. However, questions about grading do occasionally arise. 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 one week of when the work was returned. We reserve the rights to make regrade decisions "off-line" (i.e., not immediately at the time requested).

Late Work Policy: Late assignments will be penalized at 10% per day past the deadline. Assignments more than seven days late will not be graded. If you anticipate difficulty meeting a deadline, you must contact the instructor before the due date. Extensions may be granted only in cases of documented emergencies or extenuating circumstances that are verified by the Dean of Students through an official Request for Absence Verification. Students seeking extensions for any emergency reason should always begin the process with the Dean of Students, who will determine whether documentation supports an accommodation.

Accommodation of Disabilities

Office of Accessibility Resources and Services (OARS) offers long term and temporary accommodations for undergraduate, graduate and visiting students at NJIT. If you need accommodations due to a disability, please contact OARS via email at oars@njit.edu. The office is in Kupfrian Hall Room 201. For further information please visit the OARS office website at: https://www.njit.edu/accessibility/. Please note, if you are eligible for extra time and would like to use it in the final exam, please notify the instructor and OARS at least two weeks prior to the exam so that accommodations can be made.

Student Absences for Religious Observations

NJIT is committed to supporting students observing religious holidays. Students must provide notification in writing of any conflicts between course requirements and religious observances, ideally by the end of the second week of classes and no later than two weeks before the anticipated absence. We will do our best to provide academically reasonable accommodations, allowing students to complete missed assignments, exams, quizzes, or other coursework within the term.

Use of Artificial Intelligence Tools

Artificial intelligence (AI) tools may be used as a supplementary resource in this course, for example, to clarify concepts, explore alternative explanations, review background material, or gain familiarity with current AI technologies. However, AI tools may not be used to generate, refine, or complete any graded work. This includes (but is not limited to) drafting or editing reports, producing or improving project deliverables, solving homework problems, writing or debugging code, preparing presentations, or assisting with exams. This course is designed to help you develop independent understanding of foundational AI methods and the ability to solve problems on your own. For that reason, all submitted work must reflect your personal reasoning, analysis, and effort. Submitting AI-generated content as your own constitutes academic misconduct and will be handled according to NJIT's Academic Integrity Policy. If you are unsure whether a particular use of AI is allowed, ask the instructor before using it.

Collaboration and Honor Code

Collaboration is encouraged as a way to learn, but all work you submit must represent your own understanding and your own writing. You may discuss ideas, approaches, and high-level concepts with classmates; however, you must write up all solutions independently and in your own words. When you collaborate at the discussion level, you must list the names of the students you spoke with at the top of your submission. Copying or sharing homework, code, or written solutions, whether in full or in part, is strictly prohibited. All submitted assignments will be routinely checked for similarities. Any student found to have copied work, allowed work to be copied, or used unauthorized sources will be referred to the Dean of Students and the NJIT Committee on Professional Conduct. Maintaining academic integrity ensures a fair and meaningful learning experience for everyone. If you are ever unsure whether a type of collaboration is permitted, ask the instructor before proceeding.

Academic Integrity Policy

"Academic Integrity is the cornerstone of higher education and is central to the ideals of this course and the university. Cheating is strictly prohibited and devalues the degree that you are working on. As a member of the NJIT community, it is your responsibility to protect your educational investment by knowing and following the academic code of integrity policy that is found at: NJIT Academic Integrity Code.

Please note that it is my professional obligation and responsibility to report any academic misconduct to the Dean of Students Office. Any student found in violation of the code by cheating, plagiarizing or using any online software inappropriately will result in disciplinary action. This may include a failing grade of F, and/or suspension or dismissal from the university. If you have any questions about the code of Academic Integrity, please contact the Dean of Students Office at dos@njit.edu."

Canvas Orientation

Students who are new to Canvas are encouraged to complete the self-paced Canvas Student Orientation. This resource provides an overview of the platform's features and will help you navigate course materials, submit assignments, and participate in discussions effectively.

These descriptions and timelines are subject to change at the discretion of the Professor.