

# CS 370.H01

## Introduction to Artificial Intelligence

New Jersey Institute of Technology · Ying Wu College of Computing · Computer Science Department

| Course information | Details                                                                              |
|--------------------|--------------------------------------------------------------------------------------|
| Semester           | Fall 2026                                                                            |
| Instructor         | Shivvrat Arya ( <a href="mailto:shivvrat.arya@njit.edu">shivvrat.arya@njit.edu</a> ) |
| Office             | GITC 4304                                                                            |
| Office hours       | Mondays and Thursdays, 1:30–2:30 PM, or by appointment                               |
| Teaching assistant | That Khiem Ton <a href="mailto:kt477@njit.edu">kt477@njit.edu</a>                    |
| Meeting            | Monday, Thursday, 2:30 PM–3:50 PM                                                    |
| Location           | Memorial Hall   Room 403                                                             |
| Assignments        | Submit through Canvas                                                                |

**Communication note:** For questions about homework, projects, exams, or other course-related matters, please use the [course discussion forum](#) whenever possible.

For email communication, I will typically respond within two business days. Please begin the subject line with “CS 370.H01:”.

**Course Modality:** All classes will be held in person. Class sessions may be recorded only for students who are unable to attend due to exceptional circumstances and who have obtained prior approval to miss the class. Recordings are not guaranteed and are intended solely for approved absences.

## Course Description

This course introduces the theoretical and computational techniques that serve as a foundation for the study of artificial intelligence (AI). Topics 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; 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, and 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 Textbook and Resources

- **Textbook:** Stuart Russell and Peter Norvig. *Artificial Intelligence: A Modern Approach*. 4th US ed. (R&N).
- Selected papers and handouts.

## Tentative Course Content

*R&N refers to the 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]
- **Exam 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]
- **Exam 2**

## Tentative Grading Policy

| Assessment                        | Weight                  |
|-----------------------------------|-------------------------|
| Homework assignments and projects | 40% of the course grade |
| Exam 1                            | 30% of the course grade |
| Exam 2                            | 30% of the course grade |

**Class participation, attendance, and periodic pop quizzes** may be considered to bump a student's final letter grade when the overall course percentage is **near a letter-grade boundary**.

Periodic pop quizzes are intended to **reinforce key concepts**.

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 needed**.

| Letter grade | Percentage range |
|--------------|------------------|
| A            | 90-100           |
| B+           | 85-89.99         |
| B            | 80-84.99         |
| C+           | 75-79.99         |
| C            | 65-74.99         |
| D            | 60-64.99         |
| F            | < 60             |

## Course and Instructor Policies

### *Makeup Exams*

Makeup exams will be considered only for documented circumstances approved by the Dean of Students. Students must follow the Dean of Students' documentation process and notify the instructor as soon as possible.

### *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. Attendance and participation may also be considered when determining whether to bump a border grade, as described in the Grading Policy. 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.

### *Responsiveness and Availability*

Under normal conditions, I will answer course-related emails within two business days. To ensure prompt handling, begin all course-related email subjects with "CS 370.H01:". We typically grade assignments within two weeks of their due date. Seek assistance as needed through email or office hours. I will share responses to frequently asked questions through course announcements.

### *Test Policy*

You must take both exams on the dates specified in the course schedule. Makeup exams will be considered only for documented circumstances approved by the Dean of Students.

### *Regrade Policy*

The course staff will grade your work carefully. However, questions about grading do occasionally arise. Please see the grader of that problem by coming to office hours or scheduling an appointment. To support smooth administration and encourage you to review graded work soon after it is returned, regrade requests must be made within one week of when the work was returned. We reserve the right to make regrade decisions "off-line" (that is, 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 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.

### *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 Academic Integrity***

Collaboration is encouraged as a way to learn. You may discuss course concepts, problem-solving ideas, and high-level approaches with classmates using natural language. However, all submitted work must reflect your own understanding and must be written or implemented independently.

You may not share, view, copy, or discuss Python code with classmates. You may not copy code, in whole or in part, from classmates, previous students, online sources, generative AI tools, or any other unauthorized source. You also may not allow another student to copy your code.

When you discuss an assignment with classmates, list their names at the top of your submission. All code submissions will be routinely checked for similarity. Suspected violations, including copying, unauthorized collaboration, or facilitating another student's misconduct, will be handled according to NJIT's academic integrity procedures.

If you are unsure whether a form of collaboration or outside assistance is permitted, ask the instructor before proceeding.

### ***Harmonize***

We will use **Harmonize** as the primary platform for class discussions and course-related questions. Harmonize is designed to facilitate efficient communication among students, the teaching assistant, and the instructor.

For questions about course material, assignments, logistics, or other topics that may be relevant to the class, please post on Harmonize rather than emailing the teaching staff directly. This allows everyone to benefit from the discussion and helps us respond more efficiently. For private or individual matters, please contact the instructor directly.

Our [class Harmonize page](#) contains the course discussion forum and related information.

For technical problems or feedback regarding Harmonize itself, please use the support resources provided through the platform.

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## **University Policies**

### ***Accommodation of Disabilities***

The 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 by email at [oars@njit.edu](mailto:oars@njit.edu). The office is in Kupfrian Hall, Room 201. For further information, visit the [OARS website](#). Please note: if you are eligible for extra time and would like to use it on an exam, notify the instructor and OARS at least two weeks before the exam so that accommodations can be made.

### ***Student Absences for Religious Observances***

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.

### ***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](mailto: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.*