Cornell Bowers CIS
College of Computing
and Information Science

CS 3700*/CS 5700 Foundations of Artificial Intelligence Reasoning and Decision-Making

Fall 2024 DRAFT Syllabus—Subject to Change

Course website: TBA

***Please note:** This course was previously numbered CS 4700 for undergraduate students. The course content and difficulty remain unchanged. It will also continue to fulfill requirements for the CS major and the same categories for the IS and ISST majors that CS 4700 fulfilled.*

General Information

Faculty Name: Haym Hirsh
Faculty Email: hbn46@cs.cornell.edu
Faculty Office Hours: TBA by the start of the fall semester.

Course Staff and Course Staff Office Hours: Course staff information and their office hours (where applicable) will be posted on the course website.

Credits and Credit Hour Options:

- **Credits:** 3.0 credits
- **Grading:** Student Option: Letter grade or S/U; No audit.
- **Co-Meets:** This syllabus covers the requirements and expectations for both CS 3700 and CS 5700, which co-meet. Any differences are noted within this document. Graduate students must enroll in the graduate-level course.

Pre-requisites: CS 2110/ENGRD 2110 and CS 2800 or equivalent or instructor permission.

Forbidden Overlap: CS 4700.

Time: This course meets Mondays and Wednesdays from 2:55 - 4:10 p.m. for a total of 28 sessions. The classroom will be announced by the Office of the University Registrar and posted on the Fall 2024 Course Roster and in Student Center. There will also be one evening prelim and a final exam. The dates and times for the evening prelim and the final will be scheduled and announced by the Office of the University Registrar; the final will be held during the university's final exam period.

Enrollment Information and Questions: If you have questions about enrolling in this course, please review the Bowers CIS enrollment policies and waitlist information available on the Bowers CIS Courses Help webpage. If you can't find the answer to your question, please submit a ticket on that same page for assistance.

Course Description

Introduction to major topics in artificial intelligence, including heuristic search, game-playing, knowledge representation and reasoning, planning, probabilistic inference, sequential decision making and reinforcement learning.

Course Topics

- Problem solving architectures: principles of state space, uninformed ("blind") search, informed ("heuristic") search, and local search.
- Adversarial search: games, optimal strategies, imperfect, real-time decisions.
- Logical agents: propositional and first order logic, knowledge bases and inference.
- Uncertainty and probabilistic reasoning: probability concepts, Bayesian networks, probabilistic reasoning over time, Markov decision processes, and reinforcement learning.

Course Objectives/Student Learning Outcomes

After completing the course, students will be able to:

- Design Intelligent Agent architectures;
- Implement core problem solving, search, reasoning, and reinforcement learning methods;
- Examine the computational complexity of AI methods;

- Recognize key ideas and milestones in the history of AI;
- Explain the challenges faced in attempting to achieve broadly capable AI systems;
- Recognize the causes of deleterious behaviors by AI systems and their societal implications; and,
- Incorporate AI ethics and AI safety issues into the design of AI systems.

Course Materials

Lecture slides, recommended readings, and other materials are available from the course website on Canvas. For additional readings, please see: *Artificial Intelligence: A Modern Approach* (4th Edition) by Stuart Russell and Peter Norvig. Pearson, 2020. ISBN 978-0134610993.

Method of Assessing Student Achievement

Students are expected to attend the lectures and participate in class discussions. The discussions in class provide a valuable deeper perspective on the material. Moreover, understanding something on your own often takes you more time than attending the class.

CS 3700 Basis of Grading Determination

- Homework (40%)
- Prelim/Midterm (20%)
- Final (35%)
- Participation (5%)

CS 5700 Basis of Grading Determination

- Homework + an additional essay on AI (40%)
- Prelim/Midterm (20%)
- Final (35%)
- Participation (5%)

Grading Scale: This course uses a letter grading system, which is the official grading system at Cornell University (external link). The median grade has

historically been a B+. If needed, the final letter grades are curved up. Final grades are never curved down. So, you're not "competing with the other students in the class."

Prelim and Final Exam Dates: The evening prelim and final exam will be scheduled and announced by the Office of the University Registrar; as mentioned above the final exam will be held during the university's finals week period.

Prelim and Final Exam Modality: In-person only!!!! Only take the class if the dates/times work for you.

Course Management

Homework and Late Homework Policy: Homework due dates will be shared in class and on Canvas. Each student will receive 7 one-day extensions to be used (almost) however you want during the term. Max of 3 days per assignment.

Academic Integrity: There is a thin line between cooperation and collaboration, which is allowed and stimulated in this class, and plagiarism. When you turn in your work, you are signing it with your name. This certifies that you are the author of the submitted work and I assume that it is an expression of your original ideas. Even if you have discussed your work with others, you should not have copied it or let others copy your work. You can learn more about academic integrity expectations at Cornell at http://cuinfo.cornell.edu/aic.cfm.

Accommodations

This course complies with the university policies and equal access laws, and we provide accommodations for disability, religious observance, Title IX, varsity athletes, medical emergencies, and military service. Requests for academic accommodation should be made during the first three weeks of the semester, except for unusual circumstances, so arrangements can be made as soon as possible.

Students with Disabilities: Your access in this course is important to me. Please request your accommodation letter early in the semester, or as soon as you

become registered with Student Disability Services (SDS) sds.cornell.edu, so that we have adequate time to arrange your approved academic accommodations.

- Once SDS approves your accommodation letter, it will be emailed to both you and me. Please follow up with me to discuss the necessary logistics of your accommodations.
- If you are approved for exam accommodations, please consult with course staff at least two weeks before the scheduled exam date to confirm the testing arrangements.
- If you experience any access barriers in this course, such as with printed content, graphics, online materials, or any communication barriers, reach out to me or SDS right away.
- If you need immediate accommodation, please speak with me after class or send an email message to me and SDS at sds_cu@cornell.edu.

If you have, or think you might have, a disability, please contact Student Disability Services for a confidential discussion: sds_cu@cornell.edu or visit sds.cornell.edu to learn more.

Mental Health and Wellbeing: Your health and wellbeing are important to me. There are services and resources at Cornell designed specifically to bolster undergraduate, graduate, and professional student mental health and well-being. Remember, your mental health and emotional well-being are just as important as your physical health. If you or a friend are struggling emotionally or feeling stressed, fatigued, or burned out, there is a continuum of campus resources available to you: https://mentalhealth.cornell.edu/get-support/support-students. Help is also available any time day or night through Cornell's 24/7 phone consultation (607-255-5155). You can also reach out to me, your college student services office, your resident advisor (if applicable), or Cornell Health for support.

Inclusion: Students in this course come from a variety of backgrounds, abilities, and identities. To promote learning for all, each student and staff member is expected to contribute at all times to an inclusive and respectful environment in and out of class. If you feel that this is not happening, please contact Professor Selman immediately.

Important Note

Please note that this syllabus is subject to change. Changes will be announced in class and/or on the course website.