

# WENTWORTH INSTITUTE OF TECHNOLOGY

## School of Computing and Data Science

### Classical AI

### Summer 2023

Email address: kreimendahl@wit.edu

Instructor Name: Frank Kreimendahl

Classroom: CEIS 422, WENTW 305 (lab)

Office Location: Ira Allen 304

Class Schedule: MW 3:30-4:50, F 3:00-4:50 (lab)

Office hours: M 12:30-1:30, T 2:00-3:30

Lecture/Lab/Total Credits: 3/2/4

Course Website: 5700.witcompsci.com

## COURSE DESCRIPTION:

*This course is a graduate-level overview of fundamental techniques for building intelligent systems. Topics include combinatorial search, decision making, knowledge representation, planning, reasoning under uncertainty, and learning. Students will implement algorithms using each of these techniques to build fully functional programs.*

## COURSE PREREQUISITES/COREQUISITES:

**Prerequisites:** COMP5050: Modern Computing

## REQUIRED TEXTBOOK(S):

Russell, S. J., & Norvig, P. (2020). *Artificial intelligence: A modern approach*. Boston: Pearson.

## THE COLLEGE BOOKSTORE:

Location: 103 Ward Street Boston MA 02115  
Telephone: 617-445-8814

## COURSE LEARNING OUTCOMES:

At the completion of this course, graduate students should be able to:

- Implement a search-based domain
- Implement a knowledge-based domain
- Implement a logic-based domain
- Apply an appropriate algorithm to a problem using problem criteria (observability, continuity, etc.)
- Differentiate between AI agents to solve problems in different domains

## INSTRUCTIONAL METHODOLOGIES:

*This course uses traditional classroom lecturing and demonstrations with hands-on assignments that reinforce the lecture material. Assignments include paper analytics of lecture materials, as well as standard programming sections. Lectures will focus on concepts and ideas while the assignments will provide concrete experience and skills.*

## GRADING POLICY:

There will be 7-8 assignments during the semester. Each assignment will include a detailed description of the problems and expectations for successful completion.

There will also be a midterm exam and final project for this course. The final project will entail an implementation of a course-related application and a 2–4 page writeup. There will be no final exam.

Student grades are based upon the following criteria:

Assignments	60%
Labs	20%
Final Project	20%

## WENTWORTH GRADING SYSTEM:

Grade	Weight	Numerical Definition	Definition
<b>A</b>	4.00	93-100	Distinction
<b>A-</b>	3.67	90-92	High Pass
<b>B+</b>	3.33	87-89	Pass
<b>B</b>	3.00	83-86	Pass
<b>B-</b>	2.67	80-82	Provisional
<b>C+</b>	2.33	77-79	Provisional
<b>C</b>	2.00	73-76	Provisional
<b>F</b>	0.00	0-72	No Pass
<b>P</b>	0.00		Pass (for credit)
<b>S</b>	0.00		Satisfactory (no credit)
<b>U</b>	0.00		Unsatisfactory (no credit)
<b>W</b>	0.00		Withdrew
<b>IC</b>	0.00		Incomplete
<b>NR</b>	0.00		Not Reported

## ADD/DROP:

Students should check the academic calendar to confirm the add/drop deadline. Dropping and/or adding courses is done online. Courses dropped in this period are removed from the student's record.

Non-attendance does not constitute dropping a course. If a student has registered for a course and subsequently withdraws or receives a failing grade in its prerequisite, **then the student must drop that course**. In some cases, the student will be dropped from that course by the Registrar. However, it is the student's responsibility to make sure that he or she meets the course prerequisites and to drop a course if the student has not successfully completed the prerequisite. The student must see his or her academic advisor or academic department chair for schedule revision and to discuss the impact of the failed or withdrawn course on the student's degree status.

## ACADEMIC SUPPORT:

The Center for Academic Excellence facilitates Wentworth students' academic success and helps them to achieve their full learning potential. Students may choose to receive individual assistance through one-on-one tutoring in many subjects, including math, science, writing, and major classes. In addition, the Center for Academic Excellence offers Facilitated Study Groups (FSGs), tutor-led study tables, academic workshops, and learning-strategy consultations. The peer-tutoring program is certified by the College Reading and Learning Association's International Tutor Training Certification program. To make an appointment or to review our drop-in offerings, please visit [www.wit.edu/cae](http://www.wit.edu/cae). For additional assistance or support on subjects not listed, please reach out via email at [cae@wit.edu](mailto:cae@wit.edu).

## ACADEMIC HONESTY STATEMENT:

Students at Wentworth are expected to be honest and forthright in their academic endeavors. Academic dishonesty includes but is not limited to cheating, prohibited collaboration, coercion, inventing false information or citations, plagiarism, tampering with computers, destroying other people's coursework or lab or studio property, theft of course materials, posting coursework/course materials to websites, or other academic misconduct. If you have any questions, contact your professor prior to submitting an assignment for evaluation. See your academic catalogue for a full list of definitions and the WIT Academic Honesty website for the procedures: [wit.edu/policies/academic-honesty](http://wit.edu/policies/academic-honesty)

## STUDENT ACCOUNTABILITY STATEMENT:

Any attempt to pass off another's work as one's own is plagiarism.

In this course the penalty for plagiarism is a failing grade in the course for any parties concerned. It is permissible for students to discuss the nature of an assignment or how to use a particular feature of the software. However, not a single keystroke of the work you submit should be done by anyone but you, nor should your work be based on commands supplied by someone else or developed in collaboration with someone else. In other words, you should not sit down and work together with anyone else on the assignments. Nor should you give, receive, or solicit specific information (such as code, commands) from other students in this course. (This, of course, does not apply to labs that are explicitly assigned to a group.) Exchange of detailed information about an assignment is cheating and will not be tolerated.

- Copying code, online answer keys, or answers on exams, or allowing others to copy your work.
- Using unauthorized aid during an exam.
- Copying code from other students' labs or assignments, or allowing others to copy your code.
- Using labs or assignments from current or past students and submitting them as your own.
- Providing your classwork to students now or in future semesters.

For this course, if I catch you plagiarizing you will fail the course. The penalty for sharing your work with someone else is the same as receiving work from someone else. This failure supersedes a withdraw or P/NC grade. Once again, the penalty for plagiarism is immediate course failure.

## THE CENTER FOR WELLNESS:

College can be challenging, and it is common to feel overwhelmed or stressed at times. If these feelings are related to course work or academic performance, please talk to me. For more significant mental health concerns, **The Center for Wellness\* (003 Watson Hall, 617-989-4390)** provides free and confidential mental health counseling.

If you or someone you know needs support around thoughts of suicide, the following resources are available:

- The Center for Wellness, Watson 003, 617-989-4390, M-F 8:15-4:45
- BeWell@WIT 24/7 telecounseling, 617-989-4390 option #2
- Campus Police, First level of 610 Huntington Avenue, 617-989-4444, 24/7
- Samaritans, call or text 1-877-870-4673
- Crisis Text Line, text "start" to 741-741
- National Suicide Prevention Lifeline, call 1-800-273-8255
- GLBT Youth Hotline, call 1-866-488-7386
- Beth Israel Deaconess Emergency Room, 190 Pilgrim Rd Boston, MA

Students requiring academic accommodations must provide an official accommodation memo from **The Center for Wellness\* (003 Watson Hall, 617-989-4390)** and contact me privately to discuss logistics.

\* The Center for Wellness will be providing mental health counseling sessions and accessibility services appointments virtually and appointments can be scheduled by calling 617-989-4390. The Center for Wellness is open for mental health emergencies. Additionally, 24/7 emotional support is available by this same phone line. Thank you for keeping our community safe and healthy by following these procedures.

## COLLEGE OF THE FENWAY STUDENTS:

If you are enrolled in this course through COF Cross Registration, notify your course instructor. Please provide her/him with your email address to be sure that you receive course information in a timely way. You should also discuss how to access online applications that might be used in the course.

## SYLLABUS OUTLINE:

The following schedule is tentative and subject to change:

Week	Topic	Assignments
1	Intro/AI Agents	
2	Combinatorial Search	
3	Constraint Satisfaction/Games	Assignment 1
4	Propositional Logic/SAT	Assignment 2
5	First Order Logic	
6	Unification/Logic Applications	Assignment 3
7	Planning	Assignment 4
8	Planning Graphs	
9	Markov Decision Processes	Assignment 5
10	Reinforcement Learning	Assignment 6
11	Supervised Learning/Decision Trees	
12	Unsupervised Learning	Assignment 7
13	Bayes Networks	Assignment 8
14	Partial Observability	
15	AI Ethics/Final Project	Final Project due