University of New Haven

TAGLIATELA COLLEGE OF ENGINEERING

Electrical and Engineering and Computer Science

CSCI 4478-01/6660-01
Intro to AI

Fall 2024

MW Kaplan 107, 5:00 pm – 6:15 pm

Credit Hours: 3

Dr. Shivanjali Khare, Assistant Professor
Faculty Contact Information:

Office: 120B

Phone: 203-479-4872 Email: skhare@newhaven.edu

Office Hours: MW 2:00 pm - 3:15 pm, (other hours: Zoom on appointment)

Department Chair: Dr. Ali Golbazi AGolbazi@newhaven.edu

COURSE SYLLABUS

This syllabus is informational in nature and is not an express or implied contract. It is subject to change due to unforeseen circumstances, as a result of any circumstance outside the University's control, or as other needs arise. If, in the University's sole discretion, public health conditions or any other matter affecting the health, safety, upkeep or wellbeing of our campus community or operations requires the University to make any syllabus or course changes or move to remote teaching, alternative assignments may be provided so that the learning objectives for the course, as determined by the University, can still be met. The University does not guarantee that this syllabus will not change, nor does it guarantee specific in-person, on-campus classes, activities, opportunities, or services or any other particular format, timing, or location of education, classes, activities, or services.

Course Description:

CSCI 6602 or equivalent course in Python.

An introduction to the fundamental methods of artificial intelligence (AI) used in problem-solving. Techniques include heuristic search, optimization, genetic algorithms, game playing, expert systems, probabilistic reasoning, learning strategies, neural networks, natural language understanding, and image understanding. 3 credits.

This course will introduce the basic ideas and techniques underlying the design of intelligent computer systems. A specific emphasis will be on the statistical and decision-theoretic modeling paradigm.

Required Text(s):

Russell & Norvig, AI: A Modern Approach, 4th edition. Note that the slides and othercourse material do not necessarily follow the presentation in this book.

Course Structure/Course Format:

This class is offered as a on-ground course: that will combine in-person lectures, in-person and online tutorial/discussion sessions, written and online assignments, and programming projects. Active learning will constitute as much as 50% of the class. Participation will be recorded based on in-person engagement in discussions as well as submitted assignments.

Extended Course Description:

- **On-Ground:** Fully on-ground course with every student meeting in-person.

Course Objectives:

By the end of this course, you will have built autonomous agents that efficiently make decisions in fully informed, partially observable and adversarial settings. Your agents willdraw inferences in uncertain environments and optimize actions for arbitrary reward structures. Your machine learning algorithms will classify handwritten digits and photographs. The techniques you learn in this course apply to a wide variety of artificial intelligence problems and will serve as the foundation for further study in any application area you choose to pursue.

Student Learning Outcomes:

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

1. Build autonomous agents that efficiently make decisions in fully informed, partially observable and adversarial settings.
2. Create an agent that will draw inferences in uncertain environments and optimize actions for arbitrary reward structures.
3. Create a machine learning algorithm that will classify handwritten digits and photographs.

Professional Standards Addressed:

If applicable for programs accredited by specialty organizations.

Course Requirements & Assessment:

Please see official University of New Haven Academic Policies located in the links below:

Choose appropriate link(s).

Undergraduate Grading System

Graduate Grading System

Grading:

Grades earned are based on your performance on homework, quizzes, mid-term exams, project, and the final exam.

Programming Assignments	25%
Electronic Homework Assignments	15%
Written Assignments	15%
Final Project	20%
Midterm Exam	10%
Final Exam	15%
Total**	100%

Total** 100%

**Final Grades are assigned with the following scale:

Choose the scale applicable for your course. You may change the scale to the needs of the course/program.

Typical Undergraduate Scale

93 to 100	A
90 to Less than 93	A-
87 to Less than 90	B+
83 to Less than 87	B
80 to Less than 83	B-
77 to Less than 80	C+
73 to Less than 77	C
70 to Less than 73	C-
67 to Less than 70	D+
63 to Less than 67	D
60 to Less than 63	D-
Less than 60	F

Typical Graduate Scale

93 to 100	A
90 to Less than 93	A-
87 to Less than 90	B+
83 to Less than 87	B
80 to Less than 83	B-
77 to Less than 80	C+
73 to Less than 77	C
70 to Less than 73	C-
Less than 70	F

The calculation of final grades is determined by the faculty member. The calculated grade in the total column in Canvas may or may not be reflective of your final grade.

Expectations:

Students should expect to spend at least 3 hours on academic studies outside, and in addition to, each hour of class time. There will be readings, homework questions/problems, and programming projects.

Attendance Policy Statement (Optional): Actively participate in class discussions, ask questions, and collaborate on projects

TCoE Academic Lab reservation form

As a TCoE student, you have access to reserve academic lab spaces for academic purposes where you need access to specific equipment. Example approved uses might include time for a team meeting to finish a team project or a study-session with a TA. For more information or to submit your reservation, please visit: https://forms.office.com/r/EUeJT36ZFr

Course Outline/Schedule:

Day/Date	Topic/Note
26-Aug	Intro to AI

28-Aug	Uninformed Search - 1
02-Sep	Labor Day Break
04-Sep	Uninformed Search - 2
09-Sep	Informed Search
11- Sep	A* Search and Heuristics
16-Sep	CSPs I - part 1
18- Sep	CSPs I - part 2
23-Sep	CSPs II
25-Sep	Game Trees: Minimax-1
30-Sep	Game Trees: Minimax-2
02-Oct	Game Trees: Expectimax, Utilities
07-Oct	MDPs I
09-Oct	Mid-term
14-Oct	MDPs II
16-Oct	RL I
21-Oct	Fall Break
23-Oct	RL II
28-Oct	Probability
30-Oct	Programming sessions
04-Nov	BNs: Representation
06-Nov	BNs: Independence
11-Nov	Decision Networks / VPI
13-Nov	Particle Filtering and Apps of HMMs
18-Nov	HMMs
20-Nov	ML: Naïve Bayes
25-Nov	ML: Perceptrons and Logistic Regression
27-Nov	Thanksgiving Break
02-Dec	ML: Optimization and Neural Networks
04-Dec	AI Safety, Security, and Ethics
09-Dec	Final Tutorial

Diversity Statement

The University of New Haven embraces diversity and recognizes our responsibility to foster a diverse, inclusive, and welcoming environment in which all members of the Charger community of all backgrounds and identities can learn, work, and live together. We benefit from the academic, social, and cultural developments that arise from a diverse campus that is committed to equity, inclusion, belonging, and accountability.

We have a responsibility as a community and as individuals to address and remove barriers, achieve success, and sustain a culture of inclusivity, empathy, kindness, and compassion. We encourage, welcome, and embrace participation in ongoing dialogue, engagement, and education to critically examine and thoughtfully respond to the changing realities of our community. Diversity, equity, inclusion, acceptance, and belonging enrich the Charger community and are instrumental to institutional success and fulfillment of the University mission.

Reporting Bias Incidents

At the University of New Haven, there is an expectation that all community members are committed to creating and supporting a climate which promotes civility, mutual respect, and open-mindedness. There also exists an understanding that with the freedom of expression comes the responsibility to support community members' right to live and work in an environment free from harassment and fear. It is expected that all members of the University community will engage in anti-bias behavior and refrain from actions that intimidate, humiliate, or demean persons or groups or that undermine their security or self-esteem.

If you have an immediate safety concern for yourself or others, and/or believe someone poses an immediate threat to themselves or others, please contact University Police at 203-932-7070 or call 911. Community members can report bias-motivated incidents by completing the form at **www.newhaven.edu/biasreporting**. Community members are encouraged to complete this form if they are the target of bias or harassing behaviors, witness such behaviors, or gain knowledge of these behaviors occurring within the University community. All matters concerning bias and harassment will be handled by the Dean of Students Office and Human Resources Office.

University-wide Academic Policies

A continually-updated list of University-wide academic policies and descriptions of key university student resources, can be found on Canvas. You can access them by simply clicking on the (?) help button.

The University-wide academic policies include (but are not limited to) the University's attendance policy, procedures for both adding / dropping a course and course withdrawals, an explanation for the sorts of circumstances where incomplete (INC) grades could be considered by the faculty, and the academic integrity policy (among others).

It is strongly advised to include a statement regarding the use of generative artificial intelligence tools in your course, along with any other actions that could lead to academic misconduct violations and subsequent reporting. This statement serves to inform students about the expectations and it will be beneficial in the reporting process should any violations occur throughout the course. A violation should be reported by the instructor for any instance in which a sanction was imposed. Please refer to the *Faculty Guide for Academic Misconduct* *https://facultysupport.newhaven.edu/academic-integrity-information-for-faculty/* to directly access the Academic Integrity Policy.

University Student Support Services

The University recognizes that students can often use some help outside of class and offers academic assistance through several offices.

Accessibility Resources Center

The University of New Haven seeks to maintain a supportive academic environment for all students inclusive of those with disabilities including chronic health-related conditions and military service-connected disorders. If you feel that you may need reasonable accommodations to enable your full participation in this course, please provide me with your Verification of Reasonable Accommodations letter through AIM found in MyCharger or contact the Accessibility Resources Center to begin the process to ensure that accommodations can be made available to you. Reasonable accommodations are not required to be provided retroactively and may not be made without written verification from the Accessibility Resources Center. The Accessibility Resources Center is located in Sheffield Hall on the ground floor in the rear of the building, and can be reached by email at ARC@newhaven.edu or by phone at (203) 932-7332.

Center for Learning Resources (CLR)

The Center for Learning Resources (CLR), located on the lower level of the Peterson Library, comprises four units: the **Learning Lab**, which provides content tutoring for all undergraduate students; the **Writing Center**, which offers one-on-one writing support for undergraduate and graduate students; the **Grad Lab**, which provides tutoring and other academic support for graduate students; and the **Learning Assistant Program**, which places high-achieving undergraduate learning assistants in selected sections of challenging courses to help students reach their academic potential.

In addition to course-based tutoring, we offer skills-based tutoring (e.g., for computer programs and programming languages), and we also offer workshops on a wide variety of academic subjects.

The CLR sees between one-third and one-half of the student body in any given year, and we pride ourselves on being an encouraging communal space where all students feel welcome.

To make an appointment, call us at 203-932-7215, write to us at clr@newhaven.edu, download the Navigate app, or just walk in and tell us how we can help.

Center for Student Success (CSS)

The Center for Student Success can help you refine your study skills and develop new academic strategies. CSS staff assists with enhancing your time management and organizational skills. They provide understanding of your GPA, degree audit, and transcripts, and can answer general questions about academic policies. They also can connect you to campus resources and assist you with resolving issues as they arise. During registration periods, CSS advisors work in conjunction your faculty advisor to provide assistance with the advising and registration process. Finally, at various points throughout the semester, CSS works to provide students with progress reports from their instructors. Students can make an appointment to see a CSS staff member

through Navigate; the Center for Student Success can be reached via email at css@newhaven.edu.

Counseling & Psychological Services (CAPS)

CAPS offers confidential, mental health care which is included with tuition in order to support student mental health and wellbeing. The services include individual and group therapy, support groups, consultations, and 24/7 crisis support. We are available in person at Charger Plaza and remotely, and are in the office M-F, 8:30-4:30. Please call us to schedule an appointment or with any questions at 203-932-7333; you can also schedule online. If you experience a mental health crisis after hours, you can call our main number for support.

Myatt Center

The Myatt Center for Diversity and Inclusion is committed to creating a multicultural environment through intentional education, campus community engagement, and valuing the unique identities of each member of the Charger Community. Our commitment to diversity is driven by the core values of connection, belonging, inclusivity, equity, acceptance, and accountability. The Myatt Center's focus is to create a respectful and inclusive environment based our awareness and ability to engage with others who are different on many levels including ethnicity, race, sexual orientation, gender, military, religious belief, and life experiences.

Our space is open Monday through Friday from 8:30 – 9:00 P.M for students and organizations to meet, perform schoolwork or to find a safe place for downtime. If you are looking for further information on mentorship, multicultural programmatic opportunities or educational opportunities, please contact us at cdi@newhaven.edu or stop by!

Marvin K. Peterson Library

The library is here to support all members of the University with their research needs. We are proud to serve as an academic hub on campus; providing high quality resources, space for study and exploration, and staff expertise to support all stages of the research process.

Library staff can assist in locating relevant sources of information for course

assignments and projects from intro courses to graduate level assignments. To work with a librarian, you can stop by the Library Service desk on the main level of the Peterson Library, use our “Ask a Librarian” chat service, or email libraryhelp@newhaven.edu. Appointments for in-person or online consultations can also be made by using the Navigate app or completing the “Research Consultation” form on the library website.

For 24/7 online support, library staff have created LibGuides to assist with research and citation. These guides contain overviews of resources available through the library by subject, as well as tutorials on a variety of research related topics.

The Peterson Library has three floors with a mix of individual quiet study space, collaborative group study space, and bookable study rooms with technology. The main level of the library provides access to scanners, printers, and both Dell and iMac computers.

Military & Veteran Services

The Military & Veteran Affairs team is here to answer any questions Student Veterans (both current and prospective), active duty/reserve/national guard members, and military family members have regarding transitioning to higher education, VA educational benefits, formal advising, or to listen to issues pertaining to class. The University of New Haven’s Military & Veterans Affairs team consists of full-time staff, part time student employees, and VA Work Study students whose aim is to assist and support the student veteran population both on and off campus. These individuals have a dedication to the development, success, and well-being of the student veteran population on campus which includes veterans, active-duty military, service members in the reserves or national guard, and dependents using VA Education Benefits. The office advises, guides, and supports this student population and is available to assist at a moment’s notice to address the needs and concerns of this population.

Certified Green Zones

The following offices and resources are "Green Zone Certified," as staff members equipped to assist and support student veterans and military affiliated students and their unique needs. For more information on Green Zone Training please email veteranservices@newhaven.edu.

- Accessibility Resources Center
- Center for Learning Resources (CLR)
- Center for Student Success (CSS)
- Counseling & Psychological Services (CAPS)
- Marvin K. Peterson Library
- Military & Veteran Affairs