COMP 741 Practical Artificial Intelligence Syllabus

Department: Applied Engineering and Sciences Department
Credits: 4 credits
Semester: Fall 2023

INSTRUCTOR INFORMATION

Mihaela Sabin, Ph.D., Professor of Computer Science
Email: mihaela.sabin@unh.edu,

How to get in touch with the instructor

1. Course-related communication outside class takes place primarily on the **Discord** server.
2. For one-on-one communication, use the **Canvas Inbox tool** to ask questions or get feedback and guidance, and share any concerns you might have.
3. To schedule in-person or Zoom meetings use the **Canvas Inbox tool.**

COURSE INFORMATION

Site, Location, Modality, and Time

Canvas site

https://mycourses.unh.edu/courses/115532

Modality

- In-person, scheduled weekly class meetings
  - **Location:** Room 149
  - **Day/Time: Tuesday:** Section M1: 1:10 - 3:00
- In-person and online engaged time and learning activities outside class

Credit Hour Policy

This syllabus reflects the federal definition of 1 credit hour, that is:

1 credit hour = **3 clock hours** of **engaged time** per week per 1 credit over a 15-week semester.
This means that this course requires **12 clock hours of student academic work each week** (4 credit hours x 3 clock hours)

Student academic work (or engaged time) means **all your work in this class**:

- Attend class meetings and participate in learning activities
- Do weekly labs, readings, and assignments
- Participate in collaborative learning experiences, such as working with peers on labs or the course team project
- Participate in scheduled study groups
- Seek and get tutoring help and other academic supports from the Library and CAE
- Consult with and get assistance from the course instructor and classroom assistants
- Attend one-on-one check-ins with class instructor to evaluate your progress.

Academic Integrity

Individual products of your learning in this class (reading notes, presentation slides, code, answers to questions, etc.) or **individual contributions to collaborative work** (e.g., lab, team project) **must be entirely done by you**. You cannot submit as yours something done by others or obtained from external sources.

Collaborative work has clear requirements regarding the nature of collaboration. Grading is based on your **individual contribution to the collaborative work**. If unclear, you must consult with the course instructor on what is allowed. It is your responsibility to get such clarification.

Whether done individually or in collaboration, **submitted coursework must ALWAYS give clear attribution to the source(s) of content** included or integrated in your work.

- Annotate the content that originates or has been modified and integrated in your work.
- Reference the source(s) you used, whether articles, forum or blog posts, public GitHub repos, tutorial videos, or individual help.
- Give credit to individuals who have helped you, whether peers, tutors, lab/tech assistants, course instructor, or any other person (friend, relative, etc.)

Do not work on behalf of somebody else and **do not provide your work products** to **others**. If you do, you commit an act of academic dishonesty. There is no way to know whether those who get your work products intend to submit them as theirs. Equally important, this is NOT how you help someone to learn.

There are very serious repercussions if you deviate from the course and university academic honesty policy. The penalty for the **first occurrence** of academic misconduct is **no credit for the graded work** in question. The **second occurrence** of academic misconduct results in **failing the course**. You will receive notice of the academic misconduct allegation from the course instructor. The course instructor will meet with you and give you the opportunity to respond. If the violation stands, the course instructor will report it to the Office of Community Standards.

Bottom line, **do not cheat, plagiarize, or facilitate academic dishonesty.** It is very important that you review the University's Academic Integrity policy at https://catalog.unh.edu/srrr/university-policies-regulations/academic-integrity/.

Simultaneous 741/841 Course

Section M1 of this course, COMP 741, is cross-listed with Section M1 of COMP 841, which is a graduate-level course. Both 741- and 841-level of M1 sections are taught simultaneously to both undergraduate and graduate students. The content of both sections is the same in terms of goals and competencies, course schedule, and types of learning activities, whether in class and outside class. The requirements and expectations of the student work, however, differ substantially with assignments, labs, presentations, and team project. These differences are clearly stated in the assigned work requirements and in the evaluation rubrics that accompany assigned work. Graduate students are expected to demonstrate a deeper understanding of AI foundations and principles and higher proficiency of computing skills in building intelligent computation systems. This does not mean that undergraduate students will invest less than 12 hours/week of expected engaged time to learn in the course.

Canvas NameCoach
We have a new tool in Canvas, NameCoach, that will help us all to pronounce each other's names properly. Let's make our learning environment as inclusive as possible by recording our names (instructions here) and taking advantage of the opportunity to respectfully learn how to pronounce each other's names.

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GOALS AND COMPETENCIES

Catalog Course Description
Balancing the science of AI with its engineering applications, the course focuses on AI foundations and principles for building intelligent computational systems. Reasoning, planning, learning, explaining, and acting with certainty and uncertainty are AI areas in which students will practice how to build AI systems that solve real-world problems. Particular attention is given to the impact of AI applications on our society and related ethical, privacy, security, and safety implications.
Prerequisites: COMP 525 or equivalent.

Course Goals
The purpose of the course is for you to learn what AI is and what it means, in a practical and consequential sense and at all levels: personal, institutional, societal, and at all of humanity levels. Through various forms of communication and collaboration, and through development activities we will examine AI's foundations and principles, areas of research, and how AI applications are built and deployed to solve problems.

Competencies
Learning in the course will help you achieve the following professional competencies:
- Explore and critique AI applications and their impacts on individuals, communities, society, and humankind.
- Read and analyze relevant AI literature disseminated through journal articles, conference proceedings papers, and popular media. Present, discuss, and evaluate AI approaches and technologies.
- Examine, annotate, and evaluate the theoretical basis, design decisions, and implementation of open-source AI applications.
- Participate in and bring your own contribution to the development of a team project that demonstrates the applicability of neural and symbolic AI approaches.
- Practice with and develop personal qualities and behavioral patterns that are highly regarded in the workplace, such as being responsible, persistent, adaptable, and self-reflective.

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LEARNING RESOURCES

Communication and Collaboration Tools
Because of the highly collaborative nature of the course, we'll be using a variety of online tools that support collaboration, sharing, and openness.
- **Canvas** for announcements, list of classmates, gradebook, Canvas Inbox tool, and links to the UNH OneDrive, Discord instant messaging platform, and GitHub platform.

- **Discord** for the class "chat room" and conversations with channels for different topics
- **OneDrive** for learning resources and other instructional materials
- **GitHub** to make your coding-related submissions and collaborate on the course project. Using your UNH affiliation you have free access to the GitHub Student Development Pack.
- **Zoom** to hold online class meetings if we need to temporarily switch to remote learning
- **Zotero** at https://www.zotero.org/groups/4413902/practical_ai for managing bibliographic references used for assigned reading

Readings and Zotero Library

Guided by the course goals, the readings in this course are collected in a library of scholarly, technical, and news publications and materials. The library resides on the Zotero platform, which is an open-source bibliographic management system.

Wikipedia's outline of AI https://en.wikipedia.org/wiki/Outline_of_artificial_intelligence is another source of information into AI approaches and technologies. It is used to contextualize the assigned reading in the course.

Development Tools

Your personal laptop (or the laptop loaned through the Computing Program Loan Services) is the local development platform for learning activities in this class. You can either use MacOS (if you have a Mac laptop) OR Ubuntu 22.04 LTS (installed as dual boot partition with Windows, or in a virtual machine, e.g., Oracle VirtualBox, installed on Windows). In addition, AWS SageMaker will serve as a common development environment. An account will have to be requested using your UNH email address.
No phone use is permitted in class, unless directed to do so.

The **development tools** you need to have on your machine installed at the global/system level are:

- **bash**
- **Python 3.10**
- **git**
- **Visual Studio Code**
- Python tools integrated with Visual Studio Code include
    - GitHub CoPilot
    - Jupyter Notebook
    - Debugger
    - Static analysis tools (e.g., pycodestyle, pylint).

Classroom Assistants

The **Computing Program** has classroom assistants (CAs) who are available to help with your learning activities and any technical aspects in this course.

Center for Academic Enrichment (CAE) Tutoring Services

The Center for Academic Enrichment (CAE) professionals and peers are available to support all UNH Manchester students in maximizing their learning potential through individual in-person and online tutoring, in-class workshops, and study groups in math, writing, course content, study skills, time management, and personal statements. All students registered for UNH Manchester courses are entitle to one hour of individual tutoring, per course, per week. Appointments are available at https://caetutor.unh.edu. For more information contact the CAE at 603 641 4113 or unhm.cae@unh.edu.

CAE tutors are well-prepared to assist with questions, lab and homework assignments, and Python programming. Please make use of one-on-one tutoring sessions.

Academic alerts to support your success

The University is invested in your academic success. If I am concerned about your academic behavior or performance, I may submit an **academic alert**. Academic alerts are not punitive. The goal is to provide you with support and resources to support your success. They act as an important check-in point and, if you receive an academic alert, you will receive an email to your UNH email address. It is strongly recommended that you meet with a professional advisor and connect with your instructor to discuss the reason for the alert.

Course Materials - One Drive

Teaching materials and resources reside in a publicly shared One Drive folder. It includes this syllabus, weekly slides, and other materials. The **Canvas** site for this course has a link to the **Course Materials - One Drive.**

Learning Activities

Learning in this class depends heavily on ***active participation*** and ***open collaboration*** in and outside class.

Outside Class Learning

You are expected to engage in outside class learning **10 hours every week**. Outside class time is dedicated to:

- Guided, collaborative, and independent study activities
- Work to complete your assignments and reflection on your learning experience
- Participation in ongoing communication on the Discord server
- One-on-one check-ins with class instructor to evaluate your progress
- Study group work, tutoring sessions, and consultation with other supports available on Manchester campus, such as CAE, Library, and classroom assistants.

In-Class Learning

Weekly class meetings are primarily dedicated to presentations, discussions, live coding, working in pairs or small groups, and reflections. Therefore, teaching will use minimal lecturing. The expectation for productive in-class learning is that you come prepared to the class meeting by fully engaging in outside class learning.

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COURSE REQUIREMENTS

Participation

In-class learning supports everyone's participation. Outside class learning relies on study groups activities, open lab work, tutoring sessions, and general or category-focused discussions facilitated by the **Discord** server.

Assigned Reading and Reading Notes (10%)

The first exposure to AI disciplinary content happens through the assigned reading. They are important for all the learning activities in this course: class meeting discussions, individual presentations, lab activities, and the team project. All students are expected to create an outline of their reading with notes that summarize key concepts, principles, models, and techniques, along with relevant inquiries and implications derived from the reading material. Reading notes are **entirely your own individual work.** They are due the midnight BEFORE the scheduled class meeting and are NOT accepted after the deadline.

Reading Notes Presentation (15%)

Teams of 2-3 student present a summary of the assigned reading at the beginning of each class for 10-12 minutes to facilitate class discussion. The presentation slides are created collaborative in a shared OneDrive. They are due the midnight BEFORE the scheduled class meeting and are NOT accepted after the deadline.

Labs Projects (25%)

To consolidate learning of AI concepts, principles, and techniques, students work collaboratively with a partner to design, document, and implement AI solutions to lab projects. The lab projects are due the midnight BEFORE the scheduled class meeting and are NOT accepted after the deadline.

Team Project (50%)

The purpose of the project is to investigate and showcase the applicability of symbolic and neural AI approaches. You'll collaborate with a peer to propose, design, document, and showcase your investigation. Project artifacts include a project proposal, a project design, the codebase (30%), a final report (50%), and a demo (20%).

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TENTATIVE COURSE SCHEDULE

This is a **tentative** schedule, subject to change depending on the class pace, student learning needs, and/or unforeseen circumstances, such as power outage because of snowstorms. Check the course announcements and emails in **Canvas** for up-to-date information. See next page.

Wk #	Date	**Presentations, class discussion, topics of interest, and project work**	Assigned work due the following week
1	Aug 29	Getting ready: course team, tools, learning and technical support, learning and participation. The very first encounter with AI.	RN1
2	Sep 5	Supervised learning. Image classification	RN2, Lab1
3	Sep 12	Search and optimization (1)	RN3, Lab2
4	Sep 19	Object detection	RN4, Lab3
5	Sep 26	Transformer models	RN5, Lab4

6	Oct 3	Machine learning and bias	RN6
7	Oct 10	Search and optimization (2)	RN7, Lab5
8	Oct 17	Reinforcement learning	RN8, Lab6
9	Oct 24	Adversarial AI. Project ideas.	RN9, Lab7
10	Oct 31	Form project teams. Choose project topic.	Project proposal
11	Nov 7	Election day. No class.	
12	Nov 14	Project proposal presentations	
13	Nov 21	Project status report	Project development
14	Nov 28	Project status report	Project development
15	Dec 5	Project status report	Project development
	Dec 12	No class. Reading Day	
16	Dec 19	Project demos	Project completion

ASSESSMENT OVERVIEW

Final assessment of your work in this course takes into account the following learning activities:

- **Assigned Reading and Reading Notes** 10%
- **Presentation** 15%
- **Lab Projects** 25%
- **Team Project** (50%)

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COURSE POLICIES

Attendance

Class meeting attendance is important for your learning. Attendance is taken every class. **You are responsible for attending all class meetings**. See the *UNH Attendance* policy at https://catalog.unh.edu/undergraduate/academic-policies-procedures/attendance/ for more information.

In the event that you need accommodation for a religious or cultural holiday/observance, you need to request an excuse for absence by **emailing me using the Canvas Inbox tool as early in the semester as possible.**

If you miss a class meeting, you take the responsibility to do the following **three** steps:

1. **Email course instructor** using **Canvas Inbox** tool about the circumstances for missing the class either BEFORE your absence OR no later than within 3 days AFTER your absence.
2. **Contact your peers** to find out what you've missed.
3. **Make up the absence** by doing the work assigned that week.

By NOT taking this responsibility, your final grade will be lowered by **5%** for each missed class.

If your absence is because you are dealing with unexpected and extenuating circumstances, please see the policy on **Temporary Academic Supports for Extended Absences with Letter**.

If your absence might cause a **late submission**, see policy on **Late Submissions** policy below.
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Curtailed Operations

If the University curtails operations due to weather, we will not hold in-person class meeting for our safety and the safety of others. As soon as possible, the instructor will post an announcement on Canvas about possible remote class meeting, due dates, any make-up work. Please make sure you have access to the UNH Alert RAVE system. If needed, sign up for RAVE Alerts here.

Late submissions

No assignment will be accepted after the deadline and a 0 grade will be entered in the Canvas Grades.

If you are in the situation of missing a deadline **because of time constraints**, you take the responsibility to **request approval for a time extension**. This means that you MUST do the following:

1. **Email course instructor** using **Canvas Inbox BEFORE the deadline**.
2. In your email, include these TWO IMPORTANT things:
    - **Explain circumstances** that have prevented you from meeting the submission deadline.
    - **Outline plans** for making up the missed requirements, including the EXACT time when you'll submit your work, **no later than six days** after the submission deadline.

You will receive an email confirmation from the course instructor with the approval or denial of your request.

If missing a deadline is because you are dealing with unexpected and extenuating circumstances, please see the policy on **Temporary Academic Supports for Extended Absences with Letter.**
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Student Accessibility Services

According to the Americans with Disabilities Act (as amended, 2008), each student with a disability has the right to request services from UNH to accommodate his/her/their disability. If you are a student with a documented disability or believe you may have a disability that requires accommodations, please contact Student Accessibility Services (SAS) located on the Manchester campus in the Student Services Suite (Office 405A). Accommodation letters are created by SAS with the student. Please follow-up with your instructor as soon as possible to ensure timely implementation of the identified accommodations in the letter. Faculty have an obligation to respond once they receive official notice of accommodations from SAS but are under no obligation to provide retroactive accommodations. For more information refer to www.unh.edu/sas or contact SAS at 603.862.2607, 711 (Relay NH) or sas.office@unh.edu.
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Temporary Academic Supports for Extended Absences

If you are dealing with an unexpected, extenuating circumstance that will keep you out of class or affect your performance for more than a day or two, reach out to **Lisa Enright Assistant Dean of Student Success,** at lisa.enright@unh.edu to request a letter be sent to all your faculty.

If you are required to miss significant class, you will be provided temporary academic support so that you can continue to make satisfactory progress in this course. Please **email me** (using Canvas Inbox email) to schedule a virtual meeting with me, if possible, to catch up on missed content. If not, email communication will help to determine the supports that work for you, such as notes from a peer or one-on-one meeting with a classroom assistant.
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UNIVERSITY POLICIES AND RESOURCES

Basic Needs Support

Food, Housing, Financial. https://www.unh.edu/dean-of-students/getting-help/housing-food-financial-basic-needs-support

Confidentiality and Mandatory Reporting

The University of New Hampshire at Manchester and its community are committed to assuring a safe and productive educational environment for all students. Title IX makes it clear that violence, harassment, and discrimination based on sex and gender are Civil Rights offenses subject to the same kinds of accountability and the same kinds of support applied to offenses against other protected categories such as race, national origin, and ability.

If you or someone you know has experienced sexual or relationship violence, and/or stalking and harassment, you can find the appropriate resources below:

Reporting On Campus:

- Title IX Deputy Intake Coordinator: Lisa Enright 603-641-4336. Lisa's office is located on the fourth floor in Room 439.
- UNH Manchester Security: 603-541-4101 or located in the second-floor foyer

Reporting Off Campus:

- Manchester Police Department - 603-668-8711, 405 Valley St. Manchester, NH
- or your local police department

For emergencies dial 911.
Confidential Support Resources:

- YWCA, NH – 603-668-2299(24hour), 72 Concord St. Manchester, NH
- Sexual Harassment and Rape Prevention Program (SHARPP): 603-862-7233(24hour), 8 Ballard Street, Wolff House, Durham NH 03824
- The Mental Health Center of Greater Manchester: See contact information and hours above
- 24 Hour NH Sexual Violence Hotline: 1-800-277-5570
- 24 Hour NH Domestic Violence Hotline: 1-866-644-3574

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Crisis Assessment and Risk Evaluation (CARE) Team

The CARE Team provides assistance to the UNH Manchester community when there is a need to activate a systematic, coordinated response to students who may be in crisis or whose mental, emotional or psychological health condition may substantially disrupt or directly threaten the safety of the learning environment. The CARE Team receives reports regarding students of concern, develops and implements appropriate interventions, assists students in accessing appropriate resources and recommends appropriate actions to the Dean of Students when needed. More information regarding

the CARE Team can be provided by calling the Assistant Dean of Success at 603-641-4116. To report a student of concern, please go to the following link

Early Alerts Report (for undergraduate students only)

The University is invested in your academic success. If the instructor is concerned about your academic behavior or performance, they may submit an **academic alert**, particularly around Week 5 (Sep 22 – Oct 1). Academic alerts are not punitive. The goal is to provide you with support and resources to support your success. They act as an important check-in point and, if you receive an academic alert, you will receive an email to your UNH email address. It is strongly recommended that you meet with an **undergraduate professional advisor** and connect with your instructor to discuss the reason for the alert.

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Emotional or Mental Health Distress

In partnership with **The Mental Health Center of Greater Manchester**, UNH Manchester offers consultation visits in on a walk-in basis and through telehealth appointment:

- Free confidential screening & consultation with a licensed mental health therapist.
- Referrals to mental health or substance misuse treatment.
- And assistance in understanding how to afford additional treatment (with or without insurance!) or find free services.

You may email unhm.wellness@unh.edu to make an appointment to meet with a counselor by clicking here or by using the QR codes below.

For in person appointments, please scan this code	For remote appointments please scan this code.

If you would like to connect to counseling services directly, you may do so by contacting **The Greater Manchester Mental Health Center** at (603) 668 - 4111.

The National Suicide Prevention Lifeline provides 24/7, free and confidential support via phone or chat for people in distress, resources for you or your loved ones, and best practices for professionals. Call (800) 273-TALK (8255).

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Financial Literacy Resources

All students benefit from understanding their mindset about money, how to build and use a personal budget, as well as understanding interest rates, loans, insurance, investing, and more. UNH has wonderful free resources for students in Library Resource Guides https://libraryguides.unh.edu/finlit, and every student (and faculty!) can access CA$H COURSE at https://www.cashcourse.org/ by creating a free account. Find more information on the Financial Wellness site of Health & Wellness https://www.unh.edu/health/financial-wellness.

Food Pantry

The UNH Manchester Food Pantry, located in room 437 is open Monday through Friday from 8:00am-9:30pm. Any UNH Manchester community member can take what they need. If you have any questions please email UNHM.Foodpantry@unh.edu

Library

The UNH Manchester librarians are available to assist you with your research. You can contact a librarian by calling 603-641-4173 or by emailing unhm.library@unh.edu.
The following online resources provide information about library resources and services:

- UNH Manchester Library webpage: https://cps.unh.edu/library
- Online Research Guides: https://libraryguides.unh.edu/index.php?b=s
- Access Library Resources Remotely: https://libraryguides.unh.edu/remoteaccess
- Reserve a study room for Zoom classes: https://libraryguides.unh.edu/remoteaccess/studyrooms

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QPR

QPR is a training program in mental health awareness and suicide prevention training offered by trained facilitators and members of the UNH Manchester community. Please contact Lisa Enright at lisa.enright@unh.edu should your department or program want to schedule a training session.

Sexual Harassment and Rape Prevention Program (SHARPP)

Provides free and confidential advocacy and direct services to survivors. UNH Manchester's SHARPP Office Hours during Fall & Spring Semesters are Mondays 9am-4pm in Room 471.
Zoom Appointment Availability year-round is Mon-Fri 9am-4pm
24/7 Crisis Line: 603-862-SAFE (7233)
Main Office: 603-862-3494
https://www.unh.edu/sharpp/https:/www.unh.edu/sharpp
UNH Manchester students can also contact the YWCA of New Hampshire – 603-668-2299 (24hour), 72 Concord St. Manchester, NH, for crisis or emergency services.

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