COMP 3106A – Fall 2024

Introduction to Artificial Intelligence

Course Information

Class times: Tuesdays & Thursdays, 11:30am – 1:00pm
Classroom: In-person (consult Carleton Central for room location)
Course Website: https://brightspace.carleton.ca/d2l/home/288328

Instructor

Matthew Holden
Contact: matthew.holden@carleton.ca
Office Hours Time: Tuesdays & Thursdays 1:00pm – 2:00pm (or by appointment)
Office Hours Location: Herzberg Laboratories 5435

Teaching Assistants

Morgan White
MORGANWHITE3@cmail.carleton.ca
Mondays 1:30pm - 2:30pm
HP 4115

Paul Hoang
PAULHOANG@cmail.carleton.ca
Tuesdays 3pm - 4pm
HP 4115

Hoda Vafaeesefat
HodaVafaeesefat@cmail.carleton.ca
Wednesdays 9am - 11am
HP 4115

Igor Tascu
IGORTASCU@cmail.carleton.ca
Thursdays 10am - 11am
HP 4115

Adnan Khan
AdnanKhan5@cmail.carleton.ca
Fridays 5pm - 7pm (with 10-15 minute break around 6pm)
HP 4115

Course Calendar Description

Principles and tools used in Artificial Intelligence. Fundamentals of Knowledge Representation and Reinforcement Learning and Nature-Based computing. Methods for non-adversarial problem solving including non-exhaustive and heuristic-based strategies for searching the state space. Methods for adversarial problem solving, modeled as two-person and multi-person games.

Prerequisites

COMP 2402 and (COMP 2404 or SYSC 3010 or SYSC 3110) and COMP 2804.

Topics Covered

- Agents and agent-based systems
- Heuristic search
- Principles of machine learning
- Bayes theorem and Bayesian inference
- Rule-based systems
- Reinforcement learning
- Artificial Life
- Natural language processing
- Artificial neural networks

Learning Objectives

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

- Understand different types of agents and task environments
- Understand the fundamental ideas, concepts, and methods in artificial intelligence
- Select the appropriate methods from artificial intelligence to solve problems
- Implement methods and analyze their performance

Course Format

This course will be in-person. During class, we will have interactive activities such as: discussions, tutorials, demonstrations, examples, exercises, etc. In-person class attendance is very important as students will be responsible for all items discussed in class.

Communication

All announcements for the course will be made through Brightspace. You are responsible for regularly monitoring these announcements. In-person classes may also be used to elaborate on announcements.

Students are requested to ask questions or have discussions about the course or course material during the in-person classes, during instructor or TA office hours, or on Brightspace. This way, other students may benefit from the discussion. You may not, however, show or post solutions to the assessments during class or on Brightspace. Questions or discussion about your individual situation may be asked by email.

Textbook(s) and Other Resources

Recommended textbook:
Stuart Russell & Peter Norvig. Artificial Intelligence: A Modern Approach, 4th Edition. Pearson (2020). ISBN-13: 9780134610993.

The course may also use supplementary online resources available publicly or through the Carleton Library. Information on accessing these resources will be provided in class or posted on Brightspace.

This course will use Wooclap, Carleton University's web-based student response system. See here for details: https://www.wooclap.com/.

Assessment Scheme

Students will be evaluated in this course according to the following scheme. Details and submission procedures for each component will be posted on Brightspace.

Component	*Weight*
Assignments (4)	32%
Quizzes (4)	32%
Project	36%

Assignments

There will be four assignments. Each assignment will contain an implementation and associated questions. Implementations must be written in Python 3. Assignments may be completed individually or in small groups of up to three students.

Tentative assignment due dates:
Assignment #1: 2024-10-01
Assignment #2: 2024-10-29
Assignment #3: 2024-11-14
Assignment #4: 2024-12-03

Quizzes

There will be four quizzes. Each quiz will be 80 minutes in length and take place in-person during regularly scheduled class time. Quizzes are open-book, and you may consult your notes and the textbook during quizzes. You may not use electronic devices (except non-programmable scientific calculators) during quizzes; you may not consult other people during quizzes. Quizzes must be completed individually.

Tentative quiz dates:
Quiz #1: 2024-09-26
Quiz #2: 2024-10-17
Quiz #3: 2024-11-12

Quiz #4: 2024-11-28

The lowest assignment grade or the lowest quiz grade (not both) will be excluded from the total grade computation. That is, either (1) the best three out of four assignments and four out of four quizzes will count toward your total grade or (2) four out of four assignments and the best three out of four quizzes will count toward your total grade.

Project
Students will complete a project that solves a problem using techniques from artificial intelligence. The project will comprise: (1) a project proposal outlining the problem, (2) a project report detailing the work completed, and (3) a live demonstration of the work. Projects may be completed individually or in small groups of up to three students.

Tentative project due dates:
Project proposal: 2024-11-01
Project report: 2024-12-06
Project demonstration: Week of 2024-12-02 to 2024-12-06

Important Considerations

If you are unsure of the expectations regarding academic integrity (e.g. how to use and cite references, how much collaboration with classmates is appropriate), ask your instructor beforehand. Academic integrity offences are reported to the office of the Dean of Science. Information, process, and penalties for such offences can be found on the ODS webpage: https://science.carleton.ca/academic-integrity/.

Sharing assignment or quiz specifications or posting them online (to sites like Chegg, CourseHero, OneClass, etc.) is considered academic misconduct. You are never permitted to post, share, or upload course materials without explicit permission from your instructor.

References to any material you use but did not originate must be appropriately cited. This includes the use of chatbots (e.g., ChatGPT, Google Bard, Bing Chart), research assistants (e.g., Elicit), and image generators (e.g., Stable Diffusion, Dall-E), etc. Such tools must also be appropriately cited. Failure to reference materials or tools is considered academic misconduct.

For each assignment, the project proposal, and the project report, students may request a 48-hour extension with no questions asked (link to form provided on Brightspace). Late submissions beyond the extension will not be accepted. Exceptions to these rules will only be granted for accommodations provided by university policy. Technical problems do not exempt you from this. Consequently, you are advised to: (1) periodically upload your progress (e.g. upload your progress at least daily) and (2) attempt to submit your final submission well in advance of the due date and time.

For each assignment, you will be submitting one or more files that contain source code. These files must be written in Python 3, be given the correct filename, and be provided in the specified

format. Assignments that are incorrectly named or in the incorrect format will be penalized and may receive a mark of zero. If any of the source code files you submit do not run, it may receive a mark of zero. Furthermore, you are expected to demonstrate good programming practices, and your code may be penalized if it is poorly written. You are also expected to do the necessary preparatory work (i.e. devising an algorithm) before you start coding. You may be asked to present either pseudocode or a flowchart before you will receive any assistance from the instructor or a teaching assistant.

Undergraduate Academic Advisor

The Undergraduate Advisors for the School of Computer Science are available in Room 5302HP; or by email at scs.ug.advisor@cunet.carleton.ca. The undergraduate advisors can assist with information about prerequisites and preclusions, course substitutions/equivalencies, understanding your academic audit and the remaining requirements for graduation. The undergraduate advisors will also refer students to appropriate resources such as the Science Student Success Centre, Learning Support Services and Writing Tutorial Services.

SCS Computer Laboratory

Students taking a COMP course can access the SCS computer labs. The lab schedule and location can be found at: https://carleton.ca/scs/tech-support/computer-laboratories/. All SCS computer lab and technical support information can be found at: https://carleton.ca/scs/tech-support/. Technical support staff may be contacted in-person or virtually, see this page for details: https://carleton.ca/scs/tech-support/contact-it-support/.

University Policies

For information about Carleton's academic year, including registration and withdrawal dates, see Carleton's Academic Calendar.

Academic Accommodations. Carleton is committed to providing academic accessibility for all individuals. Please review the academic accommodation available to students here: https://students.carleton.ca/course-outline/.

Academic Integrity. Every student should be familiar with the Carleton University Student Academic Integrity policy. A student found in violation of academic integrity standards may be sanctioned with penalties which range from a reprimand to receiving a grade of F in the course, or even being suspended or expelled from the University. Examples of punishable offences include plagiarism and unauthorized collaboration. Any such reported offences will be reviewed by the office of the Dean of Science. More information on this policy may be found on the ODS Academic Integrity page: https://carleton.ca/registrar/academic-integrity/.

Plagiarism. As defined by Senate, "plagiarism is presenting, whether intentional or not, the ideas, expression of ideas or work of others as one's own". Such reported offences will be reviewed by

the office of the Dean of Science. More information and standard sanction guidelines can be found here: https://science.carleton.ca/students/academic-integrity/.

Unauthorized Collaboration. Senate policy states that "to ensure fairness and equity in assessment of term work, students shall not co-operate or collaborate in the completion of an academic assignment, in whole or in part, when the instructor has indicated that the assignment is to be completed on an individual basis"