CGSC 3601-B Artificial Intelligence and Cognitive Science
Prerequisites: third-year standing and CGSC 2002 and (CGSC 1005 or COMP 1005). Restricted to students enrolled in B.Cog.Sc. Honours.

Lectures: 4:05 p.m. to 5:25 p.m. on Tuesdays and Thursdays **(in person and online)**
Zoom Meeting ID: 989 1325 8112   **Passcode:** 3601
- **Zoom URL:** https://carleton-ca.zoom.us/j/98913258112?pwd=VGgxNEI1RXBadGFUSGVONWRjdkl5UT09
- **Discord:** TBA

Tutorial B1: 4:05 p.m. to 5:25 p.m. on Monday **(in person & online)**
- **B1 Zoom URL:** TBA
Tutorial B2: 11:35 a.m. to 12:55 p.m. on Wednesday **(in person & online)**
- **B2 Zoom URL:** TBA

Instructor: Mary Kelly, Ph.D. (she/her; mary.kelly4@carleton.ca)
- **Office:** 2213 Dunton Tower; https://carleton-ca.zoom.us/my/animus.lab
- **Office Hours:** By appointment **(in person or online)**

Teaching Assistants:
　　Eilene Tomkins-Flanagan (she/her; eilenetomkinsflanaga@cmail.carleton.ca)
　　Maria Vorobeva (she/they; MariaVorobeva@cmail.carleton.ca)

I. **Course description**: An overview of Artificial Intelligence (AI) techniques, such as problem solving by search, machine learning, probabilistic reasoning, neural networks, and natural language processing. By the end, you will be able to:
   - Describe various AI algorithms, including rationale for their design
   - Explain how to evaluate AI algorithms
   - Compare and contrast various AI approaches
   - Apply AI algorithms and techniques to solve problems and synthesize results

II. **Brightspace:** Slides, recorded lectures, quizzes, exams, and assignments are posted here:
   Home page: https://brightspace.carleton.ca/d2l/home/220621

III. **Textbook:** No textbook is required for the course. Readings, slides, and recorded lectures will be provided through the course website. If you require a resource beyond the course materials, the following artificial intelligence textbook is free: http://artint.info/2e/html/ArtInt2e.html If you want a resource to help you through the neural network material in the course, I recommend Tariq Rashid's *Make Your Own Neural Network* which can be purchased in ebook (Kindle) or paperback formats: https://www.amazon.com/Make-Your-Own-Neural-Network-ebook/dp/B01EER4Z4G

IV. **Software:** All students taking CGSC 3601 are required to either own or have daily access to a computer (either Mac or PC; desktop or laptop) that they can both work on and install software on. This software includes but is not limited to the programming language Python and a number of Java applets. Netbooks, Chromebooks, and Smartphones are not suitable. The computer must be running either Windows or a Mac operating system. Wifi functionality on this computer is required; we also recommend at least 8GB of RAM and sufficient hard drive space.

V. **Evaluation**: The coursework consists of an online midterm and final exam, questions to be completed after each lecture, three online quizzes on readings, three assignments, and labs/tutorials. All course materials will be available through Brightspace.

Evaluation	Value	Date
Reading quizzes	12% (4% ea.)	Feb. 6, March 14, March 21, April 9
Midterm	28%	Feb. 27 - March 1
Assignments	18% (6% ea.)	Feb. 27, March 19, April 10
Tutorials	10% (1% ea.)	Once per week on the Monday after next.
Questions	4% (0.2% ea.)	Available after each lecture, due in 1 week.
Final	28%	During final exam period.

VI. **Lectures**: In the interest of accommodating disabled, sick, immunocompromised, or COVID-cautious students, all lectures will be recorded and made available on Brightspace. In-person attendance is neither taken nor required.

VII. **Lecture questions:** Each lecture will have corresponding review or reflection question(s) worth, collectively, 4% of your final grade, due to be completed on Brightspace one week from the lecture at 11:59pm.

VIII. **Midterm and final exam**:
The midterm will cover content from the first portion of the course (up to and including week 5). The final exam will focus on the part of the class not covered by the midterm (week 6 onwards) but will also include some selected topics prior to the midterm. The midterm and the final will be based on:
(1) slides and recorded lectures, which will be made available on Brightspace,
(2) tutorial / lab topics.
Exams are **open book:** you may consult course materials while taking the exams.

IX. **Tutorials / Labs**

The tutorials are designed to provide hands on practice with concepts discussed in class. Tutorials are intended to be completable during the tutorial time allotted. You have **until midnight on the Monday after next** to submit your worksheet to your tutorial section's Brightspace page. Tutorials work sheets and materials will be made available online one week before the tutorial in which they are due. Some tutorials provide assignment time. Attendance is **not** taken and **not** mandatory.

X. **Exam Deferral Policy**

Both the midterm and final exam will be online, open on the Brightspace page for a period of several days with a time limit of 3 hours once started.

If you expect to miss the **midterm** exam (**to be completed any time from 4:05pm on Feb. 27th to 11:59pm on March 1st**), you must notify me as soon as possible.

Deferral of the **final** exam is only possible if the registrar office is notified and their protocol is followed.

XI. **Assignments**

There are three written assignments that involve the application of AI techniques . **All assignments are due by 11:59pm** on the specified date. Please avoid putting the assignment off until the last minute – this does not work well with AI assignments as they require exploration of the concepts, use of AI software, etc.

Late policy: Assignments will be accepted late if an extension has been requested **before** the deadline for submitting the assignment. If an extension has been granted, the assignment must be handed in before the assignments are graded and returned, otherwise the assignment will be graded as a zero.

Collaboration policy: You may collaborate on the assignments with **one other person**—if you do, you must clearly indicate the name of the person you worked with on the assignment you pass in (and in that case, your assignments can be the same). Group collaboration on the assignments with more than 2 people is not permitted—this will be strictly enforced.

Citation policy: If you use any external sources, like papers or Stack Exchange, *please cite these sources*. In general, if you are not sure, please check with us. Please see the notice on academic integrity towards the end of the syllabus (e.g., "A student found in violation of academic integrity standards may be awarded penalties which range from a reprimand to receiving a grade of F in the course or even being expelled from the program or University").

XII. **Reading quizzes**

There will be 4 brief online quizzes on the assigned readings which will be research papers illustrating the application of AI techniques – you are **only** required to write any **3** of the **4** scheduled quizzes and each is worth 4%. If you write all 4 quizzes, that grade will be added to the quiz total (if you obtain over 12%, that additional score up to 4% will count as bonus points to the course total).

All quizzes are due by 11:59pm on the specified date.

What happens if I miss a quiz? Make-up quizzes will not be available—if you miss a quiz because of a documented reason, you will either be provided with an extension or its weight will be added to the final.

XIII. **Email**: We, the professor and TAs, will try to respond to e-mails within 48 hours (excluding weekends and holidays).

XIV. **Course Schedule:** *This schedule is to be regarded as tentative.*

Jan. 8/10	Start of Term	**No tutorial.**
Jan. 9	Lecture	Introduction
Jan. 11	Lecture	Intelligence as Search
Jan. 15/17	*Tutorial*	*Uninformed Search*
Jan. 16	Lecture	Informed Search
Jan. 18	Lecture	Search with Costs
Jan. 22/24	*Tutorial*	*Informed Search*
Jan. 23	Lecture	Games as Search
Jan. 25	Lecture	Expert Systems and ACT-R; Quiz 1 opens
Jan. 29/31	*Tutorial*	*ACT-R and Production Systems*
Jan. 30	Lecture	Traditional Robotics; Assn 1 posted
Feb. 1	Lecture	Embodied Robotics & Bayesian Probability
Feb. 5/7	*Tutorial*	*Assignment 1 work period*
Feb. 6	Lecture	Bayesian networks; Quiz 1 closes
Feb. 8	Lecture	Naïve Bayes Classifiers
Feb. 12/14	*Tutorial*	*Bayesian networks*
Feb. 13	Lecture	Supervised Machine Learning

Feb. 15	Lecture	Training and Testing; Midterm review
Feb. 19-23	**Winter break**	**No tutorial. No lecture.**
Feb. 26/28	*Tutorial*	*Weka & machine learning*
Feb. 27	**Midterm**	**No lecture**; Online midterm opens; Assn 1 due
Feb. 29	Lecture	Reinforcement Learning; **online midterm closes March 1st**
March 4/6	*Tutorial*	*Assignment 2 posted; Assignment 2 work period*
March 5	Lecture	Q-Learning; Quiz 2 opens
March 7	Lecture	Perceptrons
March 11/13	*Tutorial*	*Perceptrons*
March 12	Lecture	Perceptrons and Learning
March 14	Lecture	Hopfield Networks; Quiz 2 closes; Quiz 3 opens
March 15		Last day for academic withdrawal
March 18/20	*Tutorial*	*Hopfield Networks*
March 19	Lecture	Multi-layer neural networks and back propagation; Assn 2 due
March 21	Lecture	Neural network design; Assn 3 posted; Quiz 3 closes
March 25/27	*Tutorial*	*Assignment 3 work period*
March 26	Lecture	Structural natural language processing; Quiz 4 opens
March 28	Lecture	Statistical NLP
April 1/3	*Tutorial*	*Natural Language Processing*
April 2	Lecture	Statistical NLP
April 4	Lecture	AI Art
April 8	End of term	**No tutorial**
April 9	Lecture	Final Exam Review; Quiz 4 closes
April 10	**Friday schedule**	**No tutorial; Assn 3 due**
April 13-25	**Exam Period**	**Final Exam online (Brightspace)**

XV. Copyright: Classroom teaching and learning activities, including lectures, discussions, presentations, etc., by both instructors and students, are copyright protected and remain the intellectual property of their respective author(s). All course materials, including presentations, outlines, and other materials, are also protected by copyright and remain the intellectual property of their respective author(s).

Students registered in the course may take notes and make copies of course materials for their own educational use only. Students are not permitted to reproduce or distribute lecture notes and course materials publicly for commercial or non-commercial purposes without express written consent from the copyright holder(s).

XVI. Addressing Human Rights Concerns: The University and all members of the University community share responsibility for ensuring that the University's educational, work and living environments are free from discrimination and harassment. Should you have concerns about harassment or discrimination relating to your age, ancestry, citizenship, colour, creed (religion), disability, ethnic origin, family status, gender expression, gender identity, marital status, place of origin, race, sex (including pregnancy), or sexual orientation, please contact the Department of Equity and Inclusive Communities at equity@carleton.ca.

In accordance with the Carleton University Undergraduate Calendar (p 34), the letter grades assigned in this course will have the following percentage equivalents:

A+ = 90-100	B+ = 77-79	C+ = 67-69	D+ = 57-59
A = 85-89	B = 73-76	C = 63-66	D = 53-56
A - = 80-84	B - = 70-72	C - = 60-62	D - = 50-52
F = Below 50			

Grades entered by Registrar:
WDN = Withdrawn from the course
DEF = Deferred

PLAGIARISM

The University Academic Integrity Policy defines plagiarism as "presenting, whether intentionally or not, the ideas, expression of ideas or work of others as one's own." This includes reproducing or paraphrasing portions of someone else's published or unpublished material, regardless of the source, and presenting these as one's own without proper citation or reference to the original source. Examples of sources from which the ideas, expressions of ideas or works of others may be drawn from include but are not limited to: books, articles, papers, literary compositions and phrases, performance compositions, chemical compounds, artworks, laboratory reports, research results, calculations and the results of calculations, diagrams, constructions, computer reports, computer code/software, material on the internet and/or conversations.

Examples of plagiarism include, but are not limited to:

- any submission prepared in whole or in part, by someone else, including the unauthorized use of generative AI tools (e.g., ChatGPT);

- using ideas or direct, verbatim quotations, paraphrased material, algorithms, formulae, scientific or mathematical concepts, or ideas without appropriate acknowledgment in any academic assignment;

- using another's data or research findings without appropriate acknowledgement;

- submitting a computer program developed in whole or in part by someone else, with or without modifications, as one's own; and

- failing to acknowledge sources through the use of proper citations when using another's work and/or failing to use quotations marks.
Plagiarism is a serious offence that cannot be resolved directly by the course's instructor. The Associate Dean of the Faculty conducts a rigorous investigation, including an interview with the student, when an instructor suspects a piece of work has been plagiarized. Penalties are not trivial. They can include a final grade of "F" for the course.

Statement on Student Mental Health
As a University student you may experience a range of mental health challenges that significantly impact your academic success and overall well-being. If you need help, please speak to someone. There are numerous resources available both on- and off-campus to support you. Here is a list that may be helpful:

Emergency Resources (on and off campus): https://carleton.ca/health/emergencies-and-crisis/emergency-numbers/

Carleton Resources:
• Mental Health and Wellbeing: https://carleton.ca/wellness/
• Health & Counselling Services: https://carleton.ca/health/
• Paul Menton Centre: https://carleton.ca/pmc/
• Academic Advising Centre (AAC): https://carleton.ca/academicadvising/
• Centre for Student Academic Support (CSAS): https://carleton.ca/csas/
• Equity & Inclusivity Communities: https://carleton.ca/equity/

Off Campus Resources:
• Distress Centre of Ottawa and Region: (613) 238-3311 or TEXT: 343-306-5550, https://www.dcottawa.on.ca/
• Mental Health Crisis Service: (613) 722-6914, 1-866-996-0991, http://www.crisisline.ca/
• Empower Me: 1-844-741-6389, https://students.carleton.ca/services/empower-me-counselling-services/
• Good2Talk: 1-866-925-5454, https://good2talk.ca/
• The Walk-In Counselling Clinic: https://walkincounselling.com

Requests for Academic Accommodations
ACADEMIC ACCOMMODATION
You may need special arrangements to meet your academic obligations during the term. For an accommodation request the processes are as follows:
Pregnancy obligation: write to me with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For accommodation regarding a formally-scheduled final exam, you must complete the Pregnancy Accommodation Form (click here).
Religious obligation: write to me with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details click here.
Academic Accommodations for Students with Disabilities: The Paul Menton Centre for Students with Disabilities (PMC) provides services to students with Learning Disabilities (LD), psychiatric/mental health disabilities, Attention Deficit Hyperactivity Disorder (ADHD), Autism Spectrum Disorders (ASD), chronic medical conditions, and impairments in mobility, hearing, and vision. If you have a disability requiring academic accommodations in this course, please contact PMC at 613-520-6608 or pmc@carleton.ca for a formal evaluation. If you are already registered with the PMC, please request your accommodations for this course through

the Ventus Student Portal at the beginning of the term, and no later than two weeks before the first in-class scheduled test or exam requiring accommodation (*if applicable*). Requests made within two weeks will be reviewed on a case-by-case basis. For final exams, the deadlines to request accommodations are published in the University Academic Calendars. After requesting accommodation from PMC, meet with me to ensure accommodation arrangements are made. Please consult the PMC website for the deadline to request accommodations for the formally-scheduled exam (if applicable).

Survivors of Sexual Violence

As a community, Carleton University is committed to maintaining a positive learning, working and living environment where sexual violence will not be tolerated, and where survivors are supported through academic accommodations as per Carleton's Sexual Violence Policy. For more information about the services available at the university and to obtain information about sexual violence and/or support, visit: https://carleton.ca/equity/sexual-assault-support-services

Accommodation for Student Activities

Carleton University recognizes the substantial benefits, both to the individual student and for the university, that result from a student participating in activities beyond the classroom experience. Reasonable accommodation will be provided to students who compete or perform at the national or international level. Write to me with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. https://carleton.ca/senate/wp-content/uploads/Accommodation-for-Student-Activities-1.pdf

Important Information

- Students must always retain a hard copy of all work that is submitted.

-Standing in a course is determined by the course instructor subject to the approval of the Faculty Dean. This means that grades submitted by the instructor may be subject to revision. No grades are final until they have been approved by the Dean

- For us to respond to your emails, we need to see your full name, CU ID, and the email must be written from your valid CARLETON address. Therefore, in order to respond to your inquiries, please send all email from your Carleton CMail account. If you do not have or have yet to activate this account, you may wish to do so by visiting http://carleton.ca/ccs/students/

-November 23, 2023: Last day for academic withdrawal from full fall and late fall classes

-March 15, 2024: Last day for academic withdrawal from full winter, late winter and fall/winter courses.

For a list of dates and deadlines, including holidays and exam dates, please visit:

https://calendar.carleton.ca/academicyear/