COMP 3105A Introduction to Machine Learning
Course Outline (Preliminary Version)

Instructor: Junfeng Wen (junfeng.wen [AT] carleton.ca)

Fall 2025
School of Computer Science
Carleton University

Course Information

Instructor: Junfeng Wen

Contact: junfeng.wen [AT] carleton.ca

Office Location: HP 5413

Office Hours: By appointment

Teaching Assistant: A list of teaching assistants and their contact/office hours information will be posted once the course starts.

Class Location: Please check Carleton Central for the room location.

Lecture Times: Tuesdays & Thursdays 2:35 PM - 3:55 PM

Course Website: https://brightspace.carleton.ca/d2l/home/369306

Important dates and deadlines can be found here: Dates, Deadlines, and Regulations - Registrar's Office, including class suspension for fall, winter breaks, and statutory holidays.

Course Calendar Description

An introduction to methods for automated learning of relationships on the basis of empirical data. Includes topics in supervised and unsupervised machine learning and deeper knowledge of specific algorithms and their applications. Evaluation and quantification of performance of ML systems. Discussion of data ethics.

Includes: Experiential Learning Activity

Precludes additional credit for COMP 4105 (no longer offered), SYSC 4415.

Prerequisite(s): COMP 2402 and (COMP 2404 or SYSC 3010 or SYSC 3110) and COMP 2804 and (MATH 1104 or MATH 1107).

Students are expected to be familiar with linear algebra, calculus, basic statistics and Python programming.

Learning Materials

Students are not required to purchase textbooks or other learning materials for this course. The following textbooks are recommended and freely available online.

- *The Elements of Statistical Learning*, Hastie, Tibshirani, and Friedman
- *Pattern Recognition and Machine Learning*, Bishop
- *Deep Learning*, Goodfellow, Bengio, and Courville

Topics Covered and Learning Outcomes

This course will cover the following (tentative) topics

Week	Topic
Sept 4	Course overview
Sept 9/11	Math review, linear regression
Sept 16/18	Logistic regression
Sept 23/25	Model evaluation/selection, generalized linear models
Sept 30/Oct 2	Regularization
Oct 7/9	Support vector machines
Oct 14/16	Multiple outputs
Oct 21	None (fall break)
Oct 28/30	Dimensionality reduction, clustering
Nov 4/6	Probabilistic models, neural network basics
Nov 11/13	Neural network optimization, CNN
Nov 18/20	RNN
Nov 25/27	Decision tree, ensemble methods
Dec 2/4	Final review

Upon completion, students should be able to

- Develop a solid understanding of the fundamental concepts and principles in machine learning
- Understand a wide range of machine learning algorithms from a mathematical perspective, their applicability, strengths and weaknesses
- Design and implement various machine learning algorithms and evaluate their performance in real-world applications

Assessment Scheme

Component	Grade Value	Due Date
Quizzes	10%	Weekly on Fridays
Assignment 1	15%	**Sept 28**
Assignment 2	15%	**Oct 19**
Assignment 3	15%	**Nov 16**
Assignment 4	15%	**Nov 30**
Final Exam	30%	TBD

For assignments

- Done in groups of two
- For assignments only, you have three excused days **throughout the term** (rounded up to the nearest day) to account for any unforeseeable difficulties. After that no late submission will be accepted
- Students have **one week** to change the assignment grade after posted if there is any issue. After that there will be no regrade

For weekly quizzes

- Done individually on Brightspace
- The lowest two will be dropped from the final grade calculation

Submissions are handled electronically (i.e., through Brightspace). Technical problems do not exempt you from late policy, so if you wait until the last minute and then have issues with your connection, it will still count as a late submission. Consequently, you are advised to

1. Periodically upload you progress
2. Attempt to submit your final submission early (e.g., at least one hour in advance of the due date and time) and
3. Download the submitted files to make sure they are correct

For each assignment, you will be submitting one or more files that contain source code, and these files must 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.

Intellectual Property

All materials created for this course (including, but not limited to, lecture notes, in-class examples, tutorial exercises, assignments, examinations, and posted solutions) remain the intellectual property of the instructor. These materials are intended for the personal and non-transferable use of students registered in the current offering of the course. Reposting, reproducing, or redistributing any course materials, in part or in whole, without the written consent of the instructor, is strictly prohibited.

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

Undergraduate Academic Advisors

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 here. All SCS computer lab and technical support information can be found here. Technical support staff may be contacted in-person or virtually, see this page for details.

Mental Health and Wellness

The Carleton Wellness Website is a wonderful resource link to include in the course outline for students.

Academic Accommodations and Regulations

Academic Accommodations. Carleton is committed to providing academic accessibility for all individuals. You may need special arrangements to meet your academic obligations during the term. The accommodation request processes are outlined on the Academic Accommodations website. If you are unsure of the expectations regarding academic Integrity (how to use and cite references, if unauthorized collaboration with lab- or classmates is permitted (and, if so, to what degree), then you must ASK your instructor.

Chat GPT/Generative AI Usage As our understanding of the uses of AI and its relationship to student work and academic Integrity continue to evolve, students are required to discuss their use of AI in any circumstance not described here with the course instructor to ensure it supports the learning goals for the course.

Academic Integrity. Students are expected to uphold the values of academic Integrity, which include fairness, honesty, trust, and responsibility. Examples of actions that compromise these values include but are not limited to plagiarism, accessing unauthorized sites for assignments or tests, unauthorized collaboration on assignments or exams, and using artificial intelligence tools such as ChatGPT when your assessment instructions say it is not permitted.

Misconduct in scholarly activity will not be tolerated and will result in consequences as outlined in Carleton University's Academic Integrity Policy. A list of standard sanctions in the Faculty of Science can be found here.

Additional details about this process can be found on the Faculty of Science Academic Integrity website.

Students are expected to familiarize themselves with and abide by Carleton University's Academic Integrity Policy.

Every student should be familiar with the Carleton University student academic integrity policy. 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. Examples of punishable offences include: plagiarism and unauthorized co-operation or collaboration. Information on this policy may be found here.

Student Rights & Responsibilities Students are expected to act responsibly and engage respectfully with other students and members of the Carleton and the broader community. See the 7 Rights and Responsibilities Policy for details regarding the expectations of non-academic behaviour of students. Those who participate with another student in the commission of an infraction of this Policy will also be held liable for their actions.

Student Concerns If you have any concerns regarding this course, your first point of contact is me. Please email me or visit during my student hours, and I will do my best to address your concerns. If I cannot resolve the issue, the next point of contact is the School of Computer Science at studentconcerns@scs.carleton.ca. If the concern remains unresolved, the final point of contact is the Office of the Dean of Science at ODScience@carleton.ca. Please follow this order of contact.

Note: You can also bring your concerns to Ombuds services.