

**DEPARTMENT OF MATHEMATICAL AND COMPUTATIONAL SCIENCES
UNIVERSITY OF TORONTO MISSISSAUGA**

**CSC311H5F LEC9101
Introduction to Machine Learning
Course Outline - Fall 2021**

Class Location & Time	Tue, 05:00 PM - 07:00 PM
Instructor	Anthony Bonner
Office Location	
Office Hours	Tues and Weds 4-5pm
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Co-Instructor	Zhang Lisa
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Course Description

An introduction to methods for automated learning of relationships on the basis of empirical data. Classification and regression

using nearest neighbour methods, decision trees, linear models, and neural networks. Clustering algorithms. Problems of overfitting and of assessing accuracy. Basics of reinforcement learning.

Prerequisite: CSC207H5 and (MAT223H5 or MAT240H5) and MAT232H5 and STA256H5

Exclusion: CSC411H5 (SCI)

Distribution Requirement: SCI

Students who lack a pre/co-requisite can be removed at any time unless they have received an explicit waiver from the department. The waiver form can be downloaded from [here](#).

Detailed Course Description

Machine learning aims to build computer systems that learn from experience, instead of being directly programmed. It is an exciting interdisciplinary field, with historical roots in computer science, statistics, pattern recognition, and even neuroscience and physics. In the past ten years, many of these approaches have converged and led to rapid advances and real-world applications. This course is a broad introduction to machine learning. It will start with basic methods of regression and classification and problems of over fitting and the evaluation of learning algorithms, and then move on to more sophisticated methods such as neural networks. As part of the course, you will expand your Python skills to include numerical and scientific programming. As a fringe benefit, you will also find out what all that math you learned is actually used for!

Students need a solid knowledge of calculus, linear algebra, probability, computer programming (including Python) and good geometric intuition. Machine learning is highly mathematical, and the ability to write and understand rigorous proofs is essential, as is the ability to use mathematics to solve real problems (as in Physics and Engineering). Consequently, mathematical maturity will be assumed.

Learning Outcomes

Students will learn to develop, program and evaluate basic machine learning methods, including their theoretical and mathematical foundations and their subsequent implementation using scientific programming in Python.

Textbooks and Other Materials

There is no required text, but specific readings will be recommended from a variety of sources, but primarily from "The Elements of Statistical Learning", Second Edition, by Hastie, Tibshirani and Friedman.

Assessment and Deadlines

Type	Description	Due Date	Weight
Assignment	Assignment 1	2021-10-08	21%
Assignment	Assignment 2	2021-11-08	21%
Assignment	Assignment 3	2021-12-07	21%
Term Test	Midterm test	2021-10-25	12%
Final Exam		TBA	25%
Total			100%

More Details for Assessment and Deadlines

No late assignments will be accepted.

The midterm test takes place online OUTSIDE OF LECTURE in the evening. It covers material from the lectures, assignments and tutorials.

The final exam is online and covers the entire course. It takes place after classes are over.

You will need a video camera, a microphone and a speaker for online use to take the midterm test and the final exam.

Students must receive at least 30% on the final exam to pass the course.

The midterm test and final exam will follow the "I don't know" policy: if you leave a question (or part) blank and write "I don't know", you will receive 20% of the marks for that question (or part). Otherwise, if you get the answer wrong, you may receive 0 marks.

Penalties for Lateness

100%

Procedures and Rules

Missed Term Work

In order to receive special consideration, email the instructor as soon as possible, together with supporting documentation. You must also declare your absence on Acorn.

In case of illness, email a completed U of T medical certificate to the instructor within one week of the missed work. The certificate must specify the exact period during which you were unable to carry out your academic work.

In case of a missed midterm, the weight of the final exam will be increased by 12% (from 25% to 37%).

In case of a missed assignment, the weight of all other work (assignments, midterm and exam) will be increased equally to account for an additional 21% of the final grade.

Missed Final Exam

Students who cannot complete their final examination due to illness or other serious causes must file an [online petition](#) **within 72 hours of the missed examination**. Late petitions will **NOT** be considered. Students must also record their absence on ACORN on the day of the missed exam or by the day after at the latest. Upon approval of a deferred exam request, a non-refundable fee of \$70 is required for each examination approved.

Academic Integrity

Honesty and fairness are fundamental to the University of Toronto's mission. Plagiarism is a form of academic fraud and is treated very seriously. The work that you submit must be your own and cannot contain anyone else's work or ideas without proper attribution. You are expected to read the handout How not to plagiarize (<http://www.writing.utoronto.ca/advice/using-sources/how-not-to-plagiarize>) and to be familiar with the Code of behaviour on academic matters, which is linked from the UTM calendar under the link Codes and policies.

Final Exam Information

Duration: 2 hours
Aids Permitted: Open book (Textbook)

Additional Information

The tutorials may introduce new material not covered in the lectures or the text. On all work, 20% of the grade will be for quality of presentation, including the use of good English. Final grades may be adjusted up or down to conform with University of Toronto grading policies.

Course announcements will be posted on the discussion board. You must follow them daily. Please ensure that your notifications are set appropriately.

Please use the discussion board for all course related discussions. Please do not post potential answers / attempts / hints for assignment questions.

If you feel there was an error in the marking of an assignment or test, you may request a remark directly on MarkUs. You must give a specific reason for the request, referring to a possible error or omission by the marker. Stating specific potential grading errors for your remark request is mandatory for us to even consider your request. However, we will ****review your entire work, not just the items you pointed out****. Please keep in mind that your grade ****may stay the same, may increase, or may even decrease**** after your remark request is assessed.

Remark requests ****must be received within one week**** of when you received the grade for that item.

Last Date to drop course from Academic Record and GPA is November 10, 2021.