Course Description

Machine learning studies “how can we build computer programs that automatically improve their performance through experience?” This course introduces fundamentals of machine learning; it covers methods, theory and algorithms needed to do research (and applications) in machine learning. Subjects of this course are taken from machine learning, classic statistics, data mining and information theory. Topics include

- regression
- density estimation
- classification
- kernel methods
- ensemble methods
- dimensionality reduction
- clustering
- online learning
- learning theories
- advanced topics (will be selectively covered if time permits)

Prerequisite

COSC 3020 or approval of the instructors. Sufficient programming skills in Matlab or Python to implement non-trivial algorithms from scratch are expected. Working knowledge on linear algebra, probability, statistics and convex optimization are expected, but we may also review these subjects so that students with strong numerate background or sufficient mathematical maturity should be able to catch up and participate.

Grading

- COSC4555: Assignment 60%, Midterm 15%, Final 25%
- COSC5555: Assignment 60%, Midterm 10%, Final 20%, Project 10%
Reference

- Additional reading materials will be available if appropriate.

Assignment Policy

- Students should hand in their own assignments. It is acceptable for students to collaborate in completing assignments, but participants should clearly indicate in each assignment with who they collaborated and which problems were worked out collaboratively.

- Some assigned problems may be covered by certain online materials. It is acceptable for students to borrow ideas from these materials while addressing problems, but exercisers should clearly indicate the reference and be ready to justify their own understanding of the submitted answers.

- Late assignment submission is acceptable. Each student has 4 late days without penalty throughout the semester; after that, 10% credit of the submitted assignment will be taken off after every 24 hours.

Attendance

Attendance is not mandatory. However, missed quizzes cannot be done later, unless approved by the instructor before the missed quizzes are taken.

Auditing

Students are allowed to audit upon the approval of the instructor.