

The Hong Kong University of Science and Technology

UG Course Syllabus (Fall 2024)

Machine Learning

COMP 4211

3 credits

Pre-requisites: (COMP 2012 OR COMP 2012H) AND (ELEC 2600 OR IEDA 2520 OR IEDA 2540 OR ISOM 2500 OR LIFS 3150 OR MATH 2411 OR MATH 2421 OR MATH 2431)

Exclusions: COMP 4331, COMP 5212, ISOM 3360

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Course Description

Machine learning is the science of making computer artifacts improve their performance by learning from data without requiring humans to program their behavior explicitly. This is an undergraduate-level introductory machine learning course designed for students with a solid computational and mathematical background. Students will learn the mathematical and computational principles underlying a variety of machine learning models and algorithms and will also gain hands-on experience by applying some of them to learn from data. The main topics covered include linear regression, logistic regression, feedforward neural networks, deep neural networks, convolutional neural networks, recurrent neural networks, principal component analysis, autoencoders, clustering, generative adversarial networks, transformers, support vector machines, decision trees and random forests.

Assessments:

Assessment Task	Contribution to Overall Course grade (%)
In-class quizzes	10%
Programming assignments	25%
Problem set	10%
Group project	20%
Final examination	35%

Reference Books and Materials

- Ethem Alpaydin (2020). *Introduction to Machine Learning*. Fourth Edition. MIT Press.
- Ian Goodfellow, Yoshua Bengio, and Aaron Courville (2016). *Deep Learning*. MIT Press.
- Kevin P. Murphy (2022). *Probabilistic Machine Learning: An Introduction*. MIT Press.
- Aston Zhang, Zachary C. Lipton, Mu Li, and Alexander J. Smola (2021). *Dive into Deep Learning*. Cambridge University Press.
- Other assigned reading materials.