DD1420 Foundations of Machine Learning 7.5 credits

Maskininlärningens grunder

This is a translation of the Swedish, legally binding, course syllabus.

Establishment

The official course syllabus is valid from spring semester 2025 according to the decision of Director of First and Second Cycle Education: J-2024-2231. Date of decision: 2024-10-16

Grading scale

A, B, C, D, E, FX, F

Education cycle

First cycle

Main field of study

Technology

Specific prerequisites

Knowledge in algebra and geometry, 7.5 higher education credits, equivalent to completed course SF1624.

Knowledge in multivariable analysis, 7.5 higher education credits, equivalent to completed course SF1626.

Knowledge in probability theory and statistics, 7,5 higher education credits, equivalent to completed course SF1912-SF1925/SF1935.

Knowledge and skills in programming, 6 credits, equivalent to completed course DD1337/DD1310-DD1319/DD1321/DD1331/DD100N/ID1018.

Knowledge in algorithms and data structures, at least
6 higher education credits, equivalent to completed course
DD1338/DD1320/DD1325/DD1328/DD1338/DD2325/ID1020/ID1021.

Active participation in a course offering where the final examination is not yet reported in LADOK is considered equivalent to completion of the course.
Being registered for a course counts as active participation.
The term 'final examination' encompasses both the regular examination and the first re-examination.

Language of instruction

The language of instruction is specified in the course offering information in the course catalogue.

Intended learning outcomes

After passing the course, the student shall be able to

– use basic concepts, language and notation that supports machine learning
– use mathematical and statistical methods that support machine learning
– derive and prove selected theoretical results
– implement basic machine learning models
– interpret the results to apply machine learning models on data
– discuss how one can solve practical machine learning problems

in order to

– be able to define problems in data analysis clearly
– formulate an appropriate maskinlärningslösning and strengthen this solution through critical and quantitative evaluation
– be well prepared to read advanced courses in machine learning.

Course contents

Important subjects in the course include:

– What is machine learning?
– Optimisation.
– Generalisation.
– Machine Learning theory.
– Neural networks and deep learning.
– Geometry in machine learning.
– Kernel methods.
– Probabilistic methods in machine learning.

– Information theory in machine learning.
– Machine learning for data synthesis.

Examination

- KON1 - Digital quizzes, 3.0 credits, grading scale: A, B, C, D, E, FX, F

- INLM - Digital assignments with oral comprehension questions, 3.0 credits, grading scale: A, B, C, D, E, FX, F

- ÖVN1 - Exercises, 1.5 credits, grading scale: P, F

Based on recommendation from KTH's coordinator for disabilities, the examiner will decide how to adapt an examination for students with documented disability.

The examiner may apply another examination format when re-examining individual students.

If the course is discontinued, students may request to be examined during the following two academic years.

Ethical approach

- All members of a group are responsible for the group's work.

- In any assessment, every student shall honestly disclose any help received and sources used.

- In an oral assessment, every student shall be able to present and answer questions about the entire assignment and solution.