SH2150 Machine Learning in Physics 7.5 credits

Maskininlärning i fysik

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

Establishment

Grading scale

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

Education cycle

Second cycle

Main field of study

Engineering Physics

Specific prerequisites

English B/English 6

Approved thesis at bachelor's level from a science-related program

Completed course in basic modern physics (SH1014 or equivalent).

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 must be able to:

- Apply numerical programming and common machine learning methods to solve a given problem
- Choose and justify an appropriate machine learning method for a given problem
- Critically evaluate and validate the results of applying a machine learning algorithm in order to be able to independently solve a physics problem using machine learning.

Course contents

- Overview of machine learning and its relation to physics
- Classification and regression
- Supervised and unsupervised learning
- Common machine learning models used in physics, including artificial neural networks
- How to evaluate the validity and applicability of machine learning models
- Generative models
- Applications of machine learning in physics, for example in the processing of experimental data, simulations and optimization
- The ethics and sustainability of machine learning
- Ongoing research in machine learning related to physics

Examination

- INL1 - Hand-in assignments, 4.5 credits, grading scale: A, B, C, D, E, FX, F
- PRO1 - Project, 3.0 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.