MF2143 Introduction to Embedded Machine Learning 7.5 credits

Introduktion till inbyggd maskininlärning

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

Establishment

The official course syllabus is valid from the autumn semester 2025, according to the decision by the Faculty Board: M-2024-0018. Date of decision: 2024-10-14.

Grading scale

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

Education cycle

Second cycle

Main field of study

Mechanical Engineering

Specific prerequisites

At least 3 credits in basic programming skills (Python and C preferred).

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 should be able to:

1. Clarify the basic principles of machine learning and their implementation with embedded systems, with the aim of understanding how machine learning can be integrated into mechatronic products.

2. Understand the limitations and challenges of implementing machine learning on microcontrollers, in order to assess the suitability of the technology for specific mechatronic products.

3. Be able to use modern integrated development environments to train basic machine learning models and implement them on microcontrollers, in order to be able to apply the latest technologies in the development of mechatronic products.

4. Be able to evaluate the performance of embedded machine learning models, in order to ensure the satisfactory implementation of the technology.

Course contents

This course provides an introduction to the application of machine learning in resource-constrained environments. The course includes lectures, seminars and laboratory sessions. Students learn to train, deploy and evaluate machine learning models on microcontrollers. Key topics include:

- Overview of machine learning and deep learning.

- Overview of embedded systems.

- TinyML for embedded machine learning: concepts, development environments and applications.

- Final project: Students implement and demonstrate a TinyML application.

Examination

- PRO1 - Project, 4.5 credits, grading scale: A, B, C, D, E, FX, F
- LAB1 - Laboration assignment, 2.0 credits, grading scale: P, F
- SEM1 - Seminar assignment, 1.0 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.

Other requirements for final grade

- Attendance and participation in laboratory sessions and seminars are compulsory.

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.