MF2141 Smart Cyber-Physical Systems (CPS) for Sustainability 6.0 credits

Smarta cyberfysiska system för hållbarhet

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

Bachelor of Science in Engineering or the 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 should be able to:

1. Define cyber-physical systems in terms of their unique characteristics, and give examples of how such systems relate to socio-technical change and sustainable development.
2. Explain different aspects of the complexity of cyber-physical systems and important aspects of how this complexity can be managed/designed.
3. Explain different methods from the field of artificial intelligence with an emphasis on reliability, their application in cyber-physical systems and their pros and cons.
4. Explain the principles of Systems Thinking and their application to cyber-physical systems.
5. Develop models of representative cyber-physical systems and analyse them to study specific effects.
6. Design a conceptual cyber-physical system, related to the above objectives, and with reference to one or more relevant UN Sustainable Development Goals.

Course contents

- Basic CPS concepts, characteristics and implications
- Artificial Intelligence in cyber-physical systems
- Systems thinking and system dynamics tools for understanding cyber-physical systems
- Design project

Examination

- INL1 - Hand in assignment 1, 3.0 credits, grading scale: P, F
- INL2 - Hand in assignment 2, 1.0 credits, grading scale: A, B, C, D, E, FX, F
- INL3 - Hand in assignment 3, 0.5 credits, grading scale: A, B, C, D, E, FX, F
- LAB1 - Lab assignment, 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.