FEO3290 Selected Topics on Emerging Information Technologies for Industrial Digitalization 8.0 credits

Valda ämnen om framväxande informationsteknik för industriell digitalisering

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

Establishment

Course syllabus for FEO3290 valid from Autumn 2021

Grading scale

P, F

Education cycle

Third cycle

Specific prerequisites

Knowledge of digital communications, corresponding to EQ2410 or similar is required.

Language of instruction

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

Intended learning outcomes

With the development of various enabling technologies, e.g., AI, 5G and beyond, industry security, digital twin, global coverage and edge computing, the digitalization of industries has attracted lots of research efforts and started to be deployed in various industry scenarios. Though some courses may involve a part of those topics, a comprehensive and vertical-application oriential course have not been developed. Moreover, a systematic study on requirements, challenges and development of information technologies for industry digitalization has not been developed yet. This course aims to address these problems by developing systematic and vertical-application oriented course for industry digitalization. The main objectives of the course are to train the students on the key information technologies for industry digital transformation and to inspire the students for potential new research topics. After the course, the students should:

1. Know an overview of and the technical requirements for industry digitalization.

2. Know the information technologies for sustainable industries.

3. Understand key requirements and enabling technologies of information technologies (both theories and practices) for industry digitalization, including e.g., wireless networks, AI, security, digital twin and global coverage etc.

4. Understand how the information technologies are applied in vertical use cases for industry digitalization.

5. Understand recent development and existing challenges of information technologies for industry digitalization.

Course contents

Lecture 1. Course information and introduction of industry transformation

Lecture 2. IP-based Convergence and Interoperability of Industrial IoT Standards

Lecture 3. High performance wireless networks Part 1, requirements, enabling technologies and theories

Lecture 4. High performance wireless networks, Part 2, Vectrical Applications and experiments.

Lecture 5. Physical Layer Security for Industry Wireless Networks

Lecture 6. Functional Safety for Industry Systems

Lecture 7. Industrial AI, Part 1, Requirements and Algorithms

Lecture 8. Industrial AI, Part 2, Vertical Applications and experiments

Lecture 9. Digital Twin

Lecture 10. Global Coverage, Satellite Based Communications and Computing

Lecture 11. Guest Lectures on Industrial Robots etc.

Lecture 12. High-accuracy industrial positioning

Lecture 13. Industrial Cloud/edge computing

Lecture 14. Reflection on Information Technologies for Sustainable Industries

Examination

• EXA1 - Examination, 8.0 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.

1. Oral presentation on one selected topic.

2. Approved survey reports on select topic, the report should be comprehensive and can be combined with student's own research. The minimum length should be 5 pages including references.

3. Attendence higher than 80% (attending 11 or more of 14 lectures/meetings).

4. Peer-reviewing at least one report.

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.