EI2433 Electrotechnical Modelling 7.5 credits

Elektroteknisk modellering

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

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

Establishment

On 04/21/2020, the Head of the EECS School has decided to establish this official course syllabus to apply from autumn semester 2020, registration number: J-2020-0562.

Grading scale

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

Education cycle

Second cycle

Main field of study

Electrical Engineering

Specific prerequisites

150 credits in technology or natural sciences and the English B 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

- apply the methodology for mathematical modelling to set up a model
- apply previously acquired knowledge to formulate mathematical models of general multi-physics problems in electrotechnical components or systems
- formulate ordinary and partial differential equations to describe different electrotechnical systems that involve electromagnetic, thermal and mechanical systems and define appropriate boundary conditions
- set up mathematical models in specialised computer programs (Matlab and COMSOL Multiphysics)
- analyse modelling results and explain them from a physical point of view
- assess the sensitivity for different models based on the modelling assumptions and the choice of parameters (e.g. material properties)
- estimate the uncertainty in the results when using a model.

Course contents

The basic stages to translate multi-physics problems to mathematical formulations to develop computer-based simulation models that are useful for research, technical design and product and software engineering in electrical engineering application fields:

- use of ordinary and partial differential equations to formulate corresponding mathematical formulations to solve electrical engineering problems
- introduction to implementation of models in COMSOL Multiphysics
- the basic theories and implementation of them in example models for specific electrotechnical problems in electrical engineering and plasma science
- practical development of multi-physical models in COMSOL Multiphysics according to the stages in mathematical modelling to deliver a design solution on a real technical problem.

Examination

- INL2 - Assignments, 5.5 credits, grading scale: A, B, C, D, E, FX, F
- PRO2 - Project, 2.0 credits, grading scale: A, B, C, D, E, FX, 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.

Transitional regulations

Students who were registered in the course up to 2019 can be examined on the obsolete examination moments INL1 and TEN1 up to autumn term 2023.
Thereafter, these students are also examined on the moments INL2 and PRO2
Inclusion of earlier passed moments will then not be possible.

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.