FEI3338 Characterisation of Dielectric Materials and Insulation Systems 10.0 credits

Karaktärisering av dielektriska material och isolersystem

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

Establishment

Course syllabus for FEI3338 valid from Spring 2020

Grading scale

P, F

Education cycle

Third cycle

Specific prerequisites

Completed master-level education in electrical engineering, physics or material science, or equivalent experience. Students are typically expected to be doctoral students in subjects within the general areas of high voltage engineering or material science.

Language of instruction

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

Intended learning outcomes

After taking this course the student must be able to demonstrate the ability to:

- Describe in detail the setup and principle of a common measurement method for each of two material or system properties, including indicative quantitative assessment of factors affecting uncertainty.
- For a specified type of material characterisation: identify and quantitatively assess error sources and their mitigation; make and justify an estimate of uncertainty.
- Suggest and contrast ways to improve a specified measurement system .
- Define and discuss ways in which the path to sustainability of power systems affects the need for new and improved insulation systems.
- Apply the analysis and estimation skills from the common part of the course in an individual project within the student's research, and present this accessibly in oral and written form.

Course contents

Basic properties of importance for electrical characterization: dielectric response, conduction, charge-distribution, partial discharge, and breakdown strength. Sustainable insulation materials and the higher demands on insulation from increased electrification and renewable energy. Solid materials are the main focus, but systems with gas or liquid are also relevant particularly when in combination with solid dielectrics. Common and state-of-art measurement principles for the material properties. External parameters, repeatability, variance. Error sources and error propagation. Uncertainty assessment and expression. Experimental methods to reduce uncertainty; trade-offs between different choices.

Disposition

First a common set of subjects for all students, based on lessons and assignments, covering the area broadly. Then specialisation based on self-study by each student, with seminars for presenting and discussing as a group. The exact distribution of time can vary according to the Course-PM for each round: indicatively, lessons (16h), seminars (16h), study, assignments and written exam in common parts of the course (100h), and the remainder on project work in the specialization.

Course literature

Course material will be specified further for each round of the course. It is based on several books and many further resources of published articles and manuals and the course's own notes and assignments.

Equipment

Nothing beyond availability of a computer.

Examination

- EXA1 - Examination, 10.0 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.

The common part of the course is examined based on several assignments and on a final written examination. The specialization is examined based on the final report and on the presentation and discussion at seminars. The subject of the specialization is defined by the student, and must be approved by the examiner before work is started on this part of the course.

Other requirements for final grade

All the four parts of examination must be approved in order to pass the course: assignments, written examination, presentations and final 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.