FEI3232 High Voltage Engineering - Advanced Level, PhD Course 8.0 credits

Högspänningsteknik - avancerad nivå, doktorandkurs

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

Establishment

Course syllabus for FEI3232 valid from Spring 2019

Grading scale

P, F

Education cycle

Third cycle

Specific prerequisites

MSc in electrical engineering, physical engineering or similar

Language of instruction

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

Intended learning outcomes

- describe the principles behind generating high DC-, AC- and impulse voltages
- develop equivalent circuit models of the different high voltage generators
- perform a dynamic response analysis of high voltage measurement systems
- compute the breakdown strength of gas-filled insulation systems with simple geometries
- approximately judge the breakdown strength of contaminated liquids and solids.
- describe the principles for measurement of capacitance and dielectric loss
- discuss ageing of electrical insulation from measurements of complex permittivity
- compute the complex permittivity from the dielectric response function and vice versa.
- discuss the measuremet principles behind partial discharges
- compute phase resolved partial discharge patterns from simple models

Course contents

The course contains the basic theories and the most important experminetal methods of high voltage engineering.

Generation of high voltages. Cockroft-Walton cascade rectifier. Transformer cascade. Marx generator for impulse voltages. High voltage dividers. High voltage test technique. Electrical breakdown strength of gaseous, liquid and solid insulation. Dielectric properties of electrical insulation. Complex permittivity and dielectric response functions. Kramers-Kronig relations. Insulation diagnostics. Dielectric spectroscopy. Partial discharges.

Two projects are included that treats measurements of high voltages and diagnostics of electrical insulation. Three laboratory exercises are included plus experimental tasks in the projects. Three non-compulsory assignments treat the theoretical aspects. Two study tours are usually offered. In the end of the course there is a written exam.

Disposition

Two projects, 3 home assignments, 3 laboratory excercises, 1 written examination and 2 study tours

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.

Other requirements for final grade

This course is run at the same time as EI2430 - High Voltage Engineering, special project tasks are given to PhD students. Minimum grade B on examination. Minimum 3 out of 6 credits on homework assignments, approved projects with minimum 4 out of 6 bonus credits.

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.