EI2430 High-voltage Engineering 7.5 credits

Högspänningsteknik

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

Establishment

Course syllabus for EI2430 valid from Spring 2011

Grading scale

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

Education cycle

Second cycle

Main field of study

Electrical Engineering

Specific prerequisites

150 university credits (hp) in engineering or natural sciences and documented proficiency in English corresponding to English B.

Language of instruction

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

Intended learning outcomes

The course is an advanced course on high-voltage technology and electrical insulating materials.

Aim

When the students have passed the course, they shall be able to

- describe the principles behind generating high DC-, AC- and impulse voltages

- develop equivalent circuit models of the different high voltage generators

- perfrom 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 kapacitance and dielectric loss

- discuss ageing of electrical insulation from measurements of complex permittivity

- compute the comple 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.

Exercises:

Problem solving related to the various parts of the course.

Course literature

E Kuffel, W S Zaengl, J. Kuffel: High-voltage engineering: fundamentals.

Selected publications

Project instructions

Lecture notes

Examination

- TENA - Examination, 3.7 credits, grading scale: A, B, C, D, E, FX, F
- LAB1 - Laboratory Work, 3.8 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.

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

Other requirements for final grade

Projects and labs. (LAB1; 3,8 cr.)
Written examination (TENA; 3,7 cr.)

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.