SK2310 Applied Electromagnetics 6.0 credits

Tillämpad elektromagnetism

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

Establishment

Course syllabus for SK2310 valid from Autumn 2012

Grading scale

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

Education cycle

Second cycle

Main field of study

Physics

Specific prerequisites

Vector analysis, Fourier and Laplace analysis.

Language of instruction

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

Intended learning outcomes

When the students have passed the course, they shall:

- be able to describe the relation between electromagnetic fields and their sources (distributions of charge and current)
- understand how isotropic materials affect the field distribution
- know Maxwell's equations (on differential and integral form) and how to use them
- be able to analyse plane waves and also fields from given current distributions
- understand retarded potentials and fields
- be able to choose adequate models and methods of solution for a specific problem
- have good ability to solve problems analytically and numerically.

Course contents

Part 1: Static fields.

Electrostatics: Coulomb's law. Electric lines of force. Evaluation of electric field and potential in vacuum and with conducting and dielectric materials. Capacitors. Energy and force in electrostatic systems. Conductors and semiconductors.

Magnetostatics: Static magnetic fields. Biot-Savart's and Ampere's laws. Fields in magnetic materials. Magnetic circuits and reluctance.

Part 2: Time-dependent fields.

Electromagnetic induction. Faraday's law. Mutual and self-induction. Energy and forces in static and quasi-stationary fields. Maxwell's equations. Conservation laws. Radiation and reception of electromagnetic waves. Transformation of electric and magnetic fields between systems with uniform velocity.

Course literature

David J. Griffiths: Introduction to Electrodynamics, 3:rd edition, Prentice Hall, ISBN 0-13-805326-x.

Examination

- INL1 - Assignments, 2.0 credits, grading scale: P, F
- TEN1 - Examination, 4.0 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.

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

Other requirements for final grade

Written exam (TEN1; 4 credits, grading A-F).
Hand-in assignments (INL1; 2 credits, grading P/F).

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.