



# El1200 Electromagnetic Field Theory 7.5 credits

Elektromagnetisk fältteori

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

Course syllabus for El1200 valid from Autumn 2008

## Grading scale

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

## Education cycle

First cycle

## Main field of study

Electrical Engineering, Technology

## Specific prerequisites

## Language of instruction

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

# Intended learning outcomes

The course gives an introduction to electromagnetic field theory, starting with the experimental laws and generalizing them in steps.

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

- define electric and magnetic fields
- calculate electric and magnetic fields from stationary and dynamic charge and current distributions
- solve simple electrostatic boundary problems
- describe simple models for electromagnetic interaction with media
- be able to choose adequate models and solution methods for specific problems
- solve problems analytically and numerically

## Course contents

### Lectures

Electrostatics: Coulomb's law. Electric lines of force. Evaluation of electric field and potential in vacuum and in the presence of conducting and dielectric materials. Practical electrostatic problems. Energy and forces in electrostatic systems. Boundary-value problems. Method of images.

Direct current: Ohms and Joules laws. The continuity equation. Boundary-value problems. Static magnetic fields:

Biot-Savarts and Ampère laws. Fields in magnetic materials. Magnetic circuits.

Electromagnetic induction:

Faradays law. Mutual and self-induction. Transformation of electrical and magnetic fields between systems with uniform velocity. Energy and forces in static and quasi-stationary fields.

Exercises:

Problem solving related to the various parts of the course.

## Course literature

Cheng: Field and Wave Electromagnetics. Addison-Wesley.

Petersson: Stationära fenomen (In Swedish)

Petersson: Elektromagnetism (In Swedish)

## Examination

- KON1 - Examination, 2.0 credits, grading scale: P, F

- KON2 - Examination, 2.0 credits, grading scale: P, F
- TEN1 - Examination, 3.5 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.

## Other requirements for final grade

Two written control tests (KON1; 2 cr.), (KON2; 2 cr.)

One written examination (TEN1; 3,5 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.