



# El1320 Electromagnetic Theory

## 9.0 credits

Teoretisk elektroteknik

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

The official course syllabus is valid from the autumn semester 2021 in accordance with Head of School decision: J-2021-0878. Decision date: 15/04/2021

### Grading scale

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

### Education cycle

First cycle

### Main field of study

Technology

### Specific prerequisites

Completed course equivalent to SI1200 Mathematical Methods in Physics.

### Language of instruction

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

## Intended learning outcomes

Having passed the course, the student should be able to:

- solve parts of problems from the major part of the course content by setting up a calculation model, choose appropriate method, make proper approximations and evaluate the result in order to be able to use the electromagnetic laws to solve basic electromagnetic field problems analytically.

To obtain higher grades, the student should be able to

- with progression in both completeness and scope, solve problems from the whole course content.

## Course contents

- electric quantities
- Coulomb's and Gauss' laws
- conducting and dielectric materials
- energy and force in electric systems
- capacitances
- method of images and boundary value problems
- magnetic quantities
- Biot-Savart's and Ampère's laws
- magnetic materials
- electromagnetic induction
- magnetic energy and force
- inductances
- Maxwell's equations
- conservation laws for energy and linear momentum
- complex representation of electromagnetic quantities
- the propagation of plane waves in materials and scattering against interfaces
- wave propagation in transmission lines and waveguides
- radiation from mobile charges and simple antennas
- transformation of electromagnetic quantities between inertial reference frames.

## Examination

- TEN1 - Written Exam, 6.0 credits, grading scale: A, B, C, D, E, FX, F

- TEN2 - Written Exam, 3.0 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.

## **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.