



# EI2405 Classical Electrodynamics 7.5 credits

Elektromagnetisk fältteori, fortsättningskurs

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

Second cycle

## Main field of study

Electrical Engineering

## Specific prerequisites

- Completed course at first cycle level in electromagnetic theory equivalent to one of EI1220 and EI1320, for the programmes in electrical engineering (CELTE) and engineering physics (CTFYs).
- Completed courses in mathematical methods in physics, containing vector calculus, separation of variables and orthogonal functions.

## 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 shall be able to:

- solve parts of problems from the major part of the course content

in order to be able to use the electromagnetic laws combined with mathematical methods to solve electromagnetic field problems.

To obtain higher grades, the student shall be able to

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

## Course contents

- Green's theorems
- Green functions to Poisson's equation
- expansions of Green functions in orthogonal bases
- electrostatic and magnetostatic boundary value problems
- multipole expansions of electrostatic and magnetostatic fields
- magnetic diffusion
- Maxwell's equations
- Green functions to the wave equation
- calculation of retarded fields from continuous sources and point charges
- application of the conservation laws for energy, linear momentum and angular momentum
- analysis of propagation, reflection and transmission of plane waves
- decomposition of fields into plane waves
- the covariant formulation of Maxwell's equations
- application of the Lorentz transformation on 4-vectors and the field tensor.

## Examination

- TEN1 - Examination, 7.5 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.

## 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.