



# 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

Course syllabus for EI2405 valid from Autumn 2010

## Grading scale

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

## Education cycle

Second cycle

## Main field of study

Electrical Engineering

## Specific prerequisites

The courses EI1200 Electromagnetic Field Theory and EI1210 Wave Propagation & Antennas, or the course EI1240 Electromagnetic Theory or equivalent knowledge of Eng B or equivalent. "

## Language of instruction

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

## Intended learning outcomes

After completion of the course the student shall be able to

- explain Green's theorem; describe Green's functions to Poisson's equation
- expand Green's functions in orthogonal bases; solve electrostatic boundary value problems
- do multipole expansions of electrostatic fields
- solve magnetostatic boundary value problems
- do multipole expansions of magnetostatic fields
- explain the physical meaning of Maxwell's equations
- explain the potentials and their Gauge transformations
- explain the Green functions for the wave equation
- calculate the retarded fields from continuous sources and point charges
- explain and use the conservation laws for energy, momentum and angular momentum
- describe the transformation properties of the fields under rotation, spatial inversion and time-reversal
- calculate the reflection and transmission of plane waves
- analyse the polarisation of an electromagnetic wave
- use the Lorentz transformation in special relativity
- describe 4-vector quantities, the field tensor and the covariant formulation of Maxwell's equations

## Course contents

### Disposition

Lessons.

### Course literature

Jackson J.D., **Classical Electrodynamics**, 3rd ed., Wiley, 1998.  
ISBN 0-471-30932-X

### 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.

## Other requirements for final grade

Passed examination.

## 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.