



EI2420 Electromagnetic Wave Propagation 7.5 credits

Elektromagnetisk vågutbredning

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

On 15/10/2019, the Dean of the EECS school has decided to establish this official course syllabus to apply from spring term 2020 (registration number J-2019-0616).

Grading scale

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

Education cycle

Second cycle

Main field of study

Electrical Engineering

Specific prerequisites

- Completed bachelor's thesis work.
- Electromagnetic Field Theory equivalent to EI1320 or both of EI1220 and EI1222.

Language of instruction

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

Intended learning outcomes

On successful completion of the course, the student should be able to solve and treat problems in parts of the field of wave propagation and scattering, as described in course content below.

For higher grades, the student should furthermore be able to, with progression in both completeness and width, solve problems from the whole course content analytically and numerically and be able to justify calculations in writing and explain simulation results.

Course contents

- integral representations of electromagnetic fields by means of Green's functions to finite and unbounded regions of arbitrary geometry
- assumptions, estimates and approximations that are used in integral representations of electromagnetic fields
- to explicitly connect the field to the sources
- methods to solve integral equations in some typical cases
- equivalence principle for currents to represent electromagnetic fields
- design of and explanation of the approximations to determine the field from a reflector antenna
- numerical calculation of current distribution, scattering and/or reflection and transmission for typical cases as: wire antenna, reflector, stratified sphere and dipole over a horizontal surface
- vector spherical harmonics
- geometrical optics and physical optics
- the differential cross-section for different objects
- dipole above a conducting surface
- the null field method and properties of its T-matrix
- derivations of the integral equations in time domain from a given time harmonic integral equation to represent transient processes
- numerical labs with laboratory report.

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.