EI1222 Electromagnetic Theory, Continuation Course 6.0 credits

Teoretisk elektroteknik, 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 Spring semester 2024 in accordance with the decision by the Head of School: J-2023-2221.Date of decision: 2023-10-10

Grading scale

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

Education cycle

First cycle

Main field of study

Technology

Specific prerequisites

Knowledge in electromagnetic field theory, 10.5 higher education credits, equivalent completed course EI1220.

Active participation in a course offering where the final examination is not yet reported in LADOK is considered equivalent to completion of the course.
Being registered for a course counts as active participation.

The term 'final examination' encompasses both the regular examination and the first re-examination.

Language of instruction

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

Intended learning outcomes

After passing the course, the student should be able to

- use their conceptual understanding of the electromagnetic laws in order to qualitatively describe the behaviour of the solution to the problem
- use their ability to manage the electromagnetic laws to, in simpler situations, set up a computational model and perform the necessary calculations: select appropriate method; make proper approximations; assess the plausibility of the result

in order to be able to take advanced courses within the area.

Course contents

- plane electromagnetic waves: reflection and transmission at oblique incidence at interfaces; critical angle; Brewster angle; polarization state
- transmission line theory: distributed parameters; characteristic impedance; matching; Smith chart; calculation of currents and voltages along a transmission line
- waveguides: mode decomposition in rectangular and circular hollow waveguides and in planar dielectric waveguides
- fields from general source distributions; Lorentz condition; time-dependent scalar and vector potentials
- basics of dipole antennas, straight wire antennas and antenna arrays; near-field and far-field properties; radiation pattern; radiation resistance; antenna measurements
- radiation fields from antenna arrays without coupling between the elements
- polarization, radiation pattern, beamwidth, directivity, antenna gain, efficiency and array factor of antennas

Examination

- TEN1 - Written Exam, 6.0 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.