



EI2410 Field Theory for Guided Waves 7.5 credits

Fältteori för vågledare

This is a translation of the Swedish, legally binding, course syllabus.

Establishment

The official course syllabus is valid from spring semester 2025 according to the decision of Director of First and Second Cycle Education: J-2024-0517.

Date of decision: 2024-10-08

Grading scale

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

Education cycle

Second cycle

Main field of study

Electrical Engineering

Specific prerequisites

- Knowledge in electromagnetic field theory, 9 higher education credits, equivalent to completed course EI1220 or EI1320.
- Knowledge in mathematical methods in physics (in particular partial differential equations), 4 higher education credits, equivalent to completed course SI1200 or SF1693 or EI2405.

Active participation in EI2405 whose final examination has not yet been reported to Ladok is equated with course completion.

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 shall 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

- demonstrate in-depth conceptual understanding and outline general principles of guided electromagnetic waves.

Course contents

- decomposition of the fields and Maxwell's equations in isotropic media
- analysis of propagating and evanescent TM-, TE- & TEM-modes in metallic hollow waveguides
- hollow waveguides with rectangular and circular cross-sections
- application of mode orthogonality at excitation from sources and at energy transport
- the mode matching method to analyse scattering at discontinuities
- analysis of attenuation of and coupling between waveguide modes
- analysis of resonance cavities, orthogonality relations, losses and bandwidth
- planar dielectric waveguides and optical fibres
- analysis of the quasi-TEM modes in multiconductor systems

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.

If the course is discontinued, students may request to be examined during the following two academic years.

Transitional regulations

For students registered with the course components PROA and TENA, it applies that an approved PROB gives credit for PROA, and that an approved TENB and an approved homework assignment gives credit for TENA. If both PROA and TENA are missing, the student must instead do PROB and TENB.

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.