



Course syllabus

Antennteknik Antenna Technology

ETEN10, 7,5 credits, A (Second Cycle)

Valid for: 2023/24

Faculty: Faculty of Engineering, LTH

Decided by: PLED E

Date of Decision: 2023-04-11

General Information

Main field: Communication Systems.

Compulsory for: MWIR1

Elective for: E4-fh, F4, F4-fel, MFOT1, N4-hn

Language of instruction: The course will be given in English

Aim

The student shall acquire fundamental knowledge of antenna theory. The student shall acquire good ability to analyse and design antennas. The student shall acquire good knowledge of antenna parameters such as directivity and radiation pattern.

The student shall carry through and document a project in which an antenna is designed, fabricated and measured.

Learning outcomes

Knowledge and understanding

For a passing grade the student must

- be able to describe the properties of the far field
- be able to use the relation between directivity and effective antenna area
- be able to explain Friis' transmission formula and the radar equation
- be able to give account for the properties of some common types of antennas
- be able to outline the theory of array antennas
- be able to interpret antenna problems as integral equations and understand the basics of their numerical solution

Competences and skills

For a passing grade the student must

- be able to calculate the far field for a given antenna current
- be able to calculate the power transmitted from a transmitting antenna to a receiving antenna
- be able to calculate the antenna pattern for a group antenna
- be able to perform pattern synthesis
- design, simulate and measure a patch antenna
- make a written account for the laboratory work

Contents

Radiation integrals. The far field. Antenna parameters. Friis' transmission formula. The radar equation. Various antenna types such as wire antennas, patch antennas, aperture antennas, array antennas including pattern synthesis, reflector antennas, measurement techniques. Numerical methods for antenna problems, e.g., the method of moments.

In the laboratory work part a patch antenna is designed, manufactured and measured.

Examination details

Grading scale: TH - (U,3,4,5) - (Fail, Three, Four, Five)

Assessment: Written examination and written laboratory report.

The examiner, in consultation with Disability Support Services, may deviate from the regular form of examination in order to provide a permanently disabled student with a form of examination equivalent to that of a student without a disability.

Parts

Code: 0110. **Name:** Written Examination.

Credits: 6. **Grading scale:** TH. **Assessment:** Written examination. **Contents:** Antenna theory.

Code: 0210. **Name:** Laboratory Work.

Credits: 1,5. **Grading scale:** UG. **Assessment:** Written report. **Contents:** Laboratory work.

Admission

Assumed prior knowledge: Electromagnetic Field Theory (F) ETE055, EITF85 (Pi) ETEF01, or (E) ESS050, EITF80.

The number of participants is limited to: No

The course overlaps following course/s: ETE100

Reading list

- Kraus J D: Antennas For All Applications.
- Orfanidis S J: Electromagnetic Waves and Antennas.
- Warren L. Stutzman, Gary A. Thiele: Antenna Theory and Design. 2012.

Contact and other information

Course coordinator: Universitetslektor Mats Gustafsson, mats.gustafsson@eit.lth.se

Course homepage: <http://www.eit.lth.se/course/eten10>