Linnæus University

Course syllabus

Faculty of Technology
Department of Physics and Electrical Engineering

4ED389 Antennteknik med tillämpningar, 7,5 högskolepoäng
Antenna technology with applications, 7.5 credits

Main field of study
Electrical Engineering

Subject Group
Electrical Engineering

Level of classification
Second Level

Progression
A1N

Date of Ratification
Approved 2020-04-20
Revised 2021-06-11 by Faculty of Technology. Assessment methods are revised.
The course syllabus is valid from spring semester 2022

Prerequisites
At least two years of study in electrical engineering (120 credits) incl. the courses Radio engineering, 7,5 credits (2ED393) + Mobile radio communication, 7,5 credits (2ED403) or the equivalent or accepted to a master program in the electrical engineering field.

Objectives

The course introduces antenna technology. The student is expected to combine knowledge of mathematics and electromagnetics in order to obtain an overview of a field of application that is based on electromagnetics. The basic concepts of mobile communication (5G) are presented in the latter part of the course.

Knowledge and understanding
After the course students are expected to:

- be able to explain various antenna types and their use
- be able to combine knowledge of Electromagnetics and Mathematics in order to analyse antennas

Skills and abilities
After the course students are expected to:

- use concepts from vector analysis to treat electromagnetic fieds
- handle basic antenna concepts like reciprocity, directivity and effective antenna area
- handle how the antenna properties are influence by the ground surface
- be able to use array antennas for phase steering of the emitted radiation

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Evaluation and approach
After the course students are expected to:

- discussion of the choice of antenna type and method of calculation
- trade off between tchnical and to some extent economical aspects in design and planning.

Content
The course comprises the following topics:

- Elementary vector analysis
- Basic electromagnetism
- Antenna concepts
- Maxwell's equations
- Wire antennas, dipoles
- Array antennas
- Schelkunoff's method

Type of Instruction
Teaching consists of lectures.

Examination
The course is assessed with the grades A, B, C, D, E, Fx or F.
The grade A constitutes the highest grade on the scale and the remaining grades follow in descending order where the grade E is the lowest grade on the scale that will result in a pass. The grade F means that the student's performance is assessed as fail (i.e. received the grade F).

Assessment of students' performance is made through written exam and assignment.

Repeat examination is offered in accordance with Local regulations for courses and examination at the first and second-cycle level at Linnaeus University.

If the university has decided that a student is entitled to special pedagogical support due to a disability, the examiner has the right to give a customised exam or to have the student conduct the exam in an alternative way.

Course Evaluation
During the implementation of the course or in close conjunction with the course, a course evaluation is to be carried out. Results and analysis of the course evaluation are to be promptly presented as feedback to the students who have completed the course. Students who participate during the next course instance receive feedback at the start of the course. The course evaluation is to be carried out anonymously.

Credit Overlap
The course cannot be included in a degree along with the following courses of which the content fully, or partly, corresponds to the content of this course: 2ED383 Antenna technology, 7.5 credits

Other
Grade criteria for the A–F scale are communicated to the student through a special document. The student is to be informed about the grade criteria for the course by the start of the course at the latest.

Required Reading and Additional Study Material
Required reading
Balanis Constantine A., *Antenna theory*, 4th ed., Wiley, 2016. Pages 350 (1100).