Blekinge Institute of Technology
School of Engineering, ASB

COURSE SYLLABUS

Antennteori

Antenna Theory

7,5 ECTS credit points (7,5 högskolepoäng)

Course code: ET2401
Educational level: Advanced level
Course level: D
Field of education:
Subject area: Electrical engineering

Version: 1
Applies from: 2007-09-05
Approved: 2007-09-05

1 Course title and credit points
The course is titled Antenna Theory/Antennteori and awards 7,5 ECTS credits. One credit point (högskolepoäng) corresponds to one credit point in the European Credit Transfer System (ECTS).

2 Decision and approval
This course is established by School of Engineering, ASB 2007-09-05. The course syllabus is approved by The Board of the Department of Electrical Engineering and applies from 2007-09-05.
Course Coordinator is the Department of Signal Processing.

3 Objectives
Many electrical engineers are connected with radio systems (e.g. radio communication, radar, navigation and radiometry systems) in their profession. Antenna Theory is central for all radio systems, and during the course the students will get a basic understanding of different radio antennas and their usage.

4 Content
- Formulation of fundamental antenna properties such as radiation pattern, radiation power density, radiation intensity, directivity, gain, antenna efficiency, beam width, bandwidth, polarization, input impedance, radiation efficiency, equivalent area.
- Friis transmission equation
- The radar equation
- Radiation integrals and auxiliary potential functions
- Antenna synthesis
- Integral equations, moment method, impedances
- Linear wire antennas, loop antennas
- Linear, planar and circular arrays.
- Broadband antennas.
- Aperture, micro strip and reflector antennas

5 Aims and learning outcomes
On completion of the course the student will be able to:
• perform and master fundamental descriptions of antenna properties
• evaluate principles behind simple antenna types
• formulate and master Friis transmission equation
• independently use radiation integrals and auxiliary potential functions
• critically formulate an appropriate model and calculate properties of linear wire and linear array antennas as well as rectangular antennas
• use critical engineering valuation capabilities

6 Generic skills
The following generic skills are trained in the course:
• Research skills
• Teamwork
• Ability to work in an international context
• Capability for applying knowledge in practice

7 Learning and teaching
The learning and teaching organization and course goals are given in the document Antenna Theory Learning guidance, found on the course home page. We will here give a summary of that document. The course is organized with lectures, exercises, antenna laboratory assignments and one project assignment. This organization is made for more active students which gains learning.
Every week there will be one new antenna assignment available at the internet. This connects antenna theory with experiments. In the end of the course there will be a laboratory assignment summarizing most parts of the course. The students have to hand in a written report of the results. The language of instruction is English.
The project work will be done in accordance with the aims and learning outcomes. The project work will be made in the same group of students as the

laboratory work. The students have to hand in a written report on the project work.
The teaching language is English.

8 Assessment and grading
Examination of the course

Code	Module	Credit	Grade
0710	Project Assignment	1.5 ECTS	U/G
0720	Exam[1]	5 ECTS	F/P/3/4/5
0730	Laboratory	1 ECTS	U/G

[1] Determines the final grade for the course, which will only be issued when all components have been approved.
The course will be graded Fail, Pass, 3, 4 or 5 .To fulfill the requirements for the aims and the learning outcome, the student has to pass all modules of the course. The exam is the instrument to give grades, see the document Antenna Theory Learning guidance, found on the course home page.
On request grades according to ECTS will be given.

9 Course evaluation
The course coordinator is responsible for systematically gathering feedback from the students in course evaluations and making sure that the results of these feed back into the development of the course.

10 Prerequisites
For acceptance into the course it's necessary to have followed these courses: MA1109 Mathematics, second course
FY1104 Wave physics

11 Field of education and subject area
The course is part of the field of education and is included in the subject area electrical engineering.

12 Restrictions regarding degree
The course cannot form part of a degree with another course, the content of which completely or partly corresponds with the contents of this course.

13 Additional information
It is an advantage but not a requirement that the student have studied:
ETC006, Digital Transmissions and Radio Systems
ETD020, Radio Communication

14 Course literature and other teaching material
Constantine A. Balanis, *Antenna Theory – Analyses and Design*, 1997, Second Edition, John Wileys and Sons Inc., ISBN – 0-471-59268-4.
Course homepage with additional course info can be found at:
http://www.bth.se/tek/asb
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