IK2500 Radio Communication, Basic Course 6.0 credits

Radiokommunikation, grundkurs

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

Course syllabus for IK2500 valid from Autumn 2008

Grading scale

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

Education cycle

Second cycle

Main field of study

Electrical Engineering

Specific prerequisites

2E1423 Signal Theory or equivalent:
asic knowledge in Bprobability and stochastic processes.

Language of instruction

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

Intended learning outcomes

- designa och utvärdera enkla trådlösa nät i både termer av täckning och kapacitet.

Upon completion of the course, the student will be able to:

- characterize fading multi-path radio channels in terms of Doppler spectrum, coherence time, power delay profile, and coherence bandwidth.

- distinguish the difference between large-scale fading and small-scale fading.

- describe and explain the effects of fading multi-path channels on the link performance of wireless communication systems.

- provide possible solutions to the problem of signal fading in wireless communication links. Describe different types of diversity and how they improve performance for mobile radio channels.

- apply propagation models and design basic radio communication links with respect to signal-to-noise ratio and outage probabilities. Special emphasis is given to propagation models for mobile and portable wireless communication.

- plan and analyze simple wireless networks in terms of coverage and capacity.

Course contents

- Introduction to radio communication, the history of radio and its evolution throughout the years, the radio frequency spectrum.

- Radio wave propagation and modeling, free space propagation model, plane earth model, radio wave reflections and diffractions.

- Antenna systems for wireless communication.

- Radio link design: Path loss modeling and link budget calculations.

- Representation of radio communication signals and systems.

- Radio channel modeling: Time/frequency domain characterization of fading multi-path channels. Discrete representation of fading multi-path channels.

- Techniques to combat fading multi-path channels. The principle of Diversity in wireless communication, combining methods.

- Introduction to wireless networks. Multi access methods, principle of frequency reuse and channel allocation. Elementary capacity analysis of wireless networks.

Course literature

Principles of Wireless Communications, Lars Ahlin, Jens Zander, and Ben Slimane

Upplaga: Förlag: studentlitteratur År: 2006

ISBN: 91-44-03080-0

Examination

- LAB1 - Laboratory Work, - credits, grading scale: P, F
- TEN1 - Examination, 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.

Other requirements for final grade

- Passed written exam.
- Passed lab exercises (2 lab exercises).
The written exam consists of two parts: A theory part (Part A) where no textbooks or other written material is allowed and one problem part (part B) where the textbook, formula sheets, dictionaries, mathematical tables,
calculators and a print-out of this year's slides are allowed.
Part A consists of 7 short-essay-type questions (1 point each), whereas part B consists of 5 problems of 3 points each.
To pass at least 3 points are required for part A and 7 points for part B.
- One homework giving a maximum of 1.5 bonus points and is added to "Part B" of the final exam (regular exam only).

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.