IK2507 Wireless Communication Systems 7.5 credits

Trådlösa kommunikationssystem

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

Establishment

Course syllabus for IK2507 valid from Spring 2019

Grading scale

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

Education cycle

Second cycle

Main field of study

Electrical Engineering

Specific prerequisites

120 university credits (hp) in engineering or natural sciences and documented proficiency in English corresponding to English A.

Language of instruction

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

Intended learning outcomes

The course aims at providing basic knowledge about problems and design approaches in wireless communication systems. This includes engineering models in radio propagation and the application of antennas to wireless communication. An introduction to spectrum resource management issues is also given in the course. 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.
- Demonstrate the ability to independently acquire knowledge about the state of the art in research and development for wireless systems

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.

Disposition

Teaching language: English

Recommended entrance qualification: IK1501 Communication Systems

Course literature

Principles of Wireless Communications, Lars Ahlin, Jens Zander, and Ben Slimane Upplaga: Förlag: studentlitteratur År: 2006 ISBN: 91-44-03080-0

Examination

- TEN1 - Examination, 6.0 credits, grading scale: A, B, C, D, E, FX, F
- LAB1 - Laboratory Work, 1.5 credits, grading scale: P, 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.

Grading scale: A/B/C/D/E/Fx/F

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.