IK2502 Wireless Networks 12.0 credits

Radionät

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

Establishment

Course syllabus for IK2502 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

Language of instruction

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

Intended learning outcomes

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

- apply the most important techniques for analyzing the capacity and Quality-of-Service of wireless networks

- use and modify simulation tools for performance evaluation of Wireless Systems(e.g. RUNE-TDMA and RUNE-CDMA).

- demonstrate your knowledge of this area through active participation in (research) projects in the area of wireless communication.

- read the current literature at both conference and journal levels.

- write technical reports with content suitable for submission to national/international conferences and journals in the area.

Course contents

- Fundamentals of wireless area communication systems: Structure and functional blocks. Performance measures: coverage, quality, capacity, Traffic models. Quality of Service (QoS) classes and negociation. Introduction to the Radio Resource Management (RRM)-problem.

- Link performance in interference limited systems: Muliple Access Communication Systems. Orthogonal, non-orthogonal signalling (F/T/CDMA).

- Cellular system concept: Cochannel interference, spectrum reuse, simple capacity analysis, blocking.. Fading models, combined outage/blocking analysis. Advanced cell structures: Sectorization, Hierarchical systems (macro/micro/pico-cells), adaptive antennas, SDMA.

- Simulation tools for cellular network analysis(RUNE).

- Handover and Mobility Management.

- Dynamic Resource Allocation.

- Transmitter Power Control: Optimal power control. C/I balancing, Removal/Admission strategies, Multirate power control.

- Frequency Hopping Systems: Random Resource allocation.

- DS-CDMA systems: Capacity calculations, Power control, Soft-Handoff, Dynamic Cell Management.

- Packet-oriented wireless access systems: Delay/Throughput. Multiple Access protocols. ALOHA, CSMA, CRA, PRMA. Wireless LAN:s IEEE 802.11, Hiperlan/2.

Course literature

Radio Resource Management for Wireless Networks, Jens Zander and Seong-Lyun Kim

Upplaga: Förlag: Artech House, Inc År: 2001

ISBN: 1-58053-146-6

Övrig litteratur

Frivillig läsning:

Lin and Chlamtac, ``Wireless and Mobile Network Architectures,'' Wiley Computer Publisher.

Optional reading:

Lin and Chlamtac, ``Wireless and Mobile Network Architectures,'' Wiley Computer Publisher.

Examination

- ANN1 - Project, 0.0 credits, grading scale: A, B, C, D, E, FX, F
- TEN1 - Examination, 12.0 credits, grading scale: A, B, C, D, E, FX, F
- LAB1 - Laboratory Work, 0.0 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.

Other requirements for final grade

a) Passed written exam.
b) Passed Lab course.
c) Written and oral project report, opposition/review report.
A number off homework problems are handed out during the course.
Results from the homework problems will score points on the first written exam. All problems solved in a satisfactory manner will alone (just barely) render the student the grade passed (D) in the written exam. The student may still take the written exam to get a higher grade. Parts a) and c) are graded and the final grade is composed of these grades (a (70%), c (30%)).

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.