IK2508 Wireless Transmission Techniques 7.5 credits

Trådlös transmissionsteknik

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

The official course syllabus is valid from the spring semester 2026 in accordance with the decision from the director of first and second cycle education: J-2024-2367.Decision date: 2024-10-29

Grading scale

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

Education cycle

Second cycle

Main field of study

Electrical Engineering

Specific prerequisites

Knowledge in wireless communication systems, 3 credits, corresponding to completed course IK2507 Wireless communication systems or completed part LAB1 in IK2507.

Knowledge in calculus in one variable, 7,5 credits, corresponding to completed course SF1624/SF1672/SF1685.

Knowledge in linear algebra, 7,5 credits, corresponding to completed course SF1624/SF1672/SF1684.

Knowledge in probability theory and statistics, 6 credits, corresponding to completed course SF1910-SF1924/SF1935.

Knowledge in English corresponding to completed upper secondary course English B/6.

Language of instruction

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

Intended learning outcomes

After passing the course, the student should be able to

- evaluate wireless link performance (bit error rate) in a structured way and evaluate tradeoffs
- perform system simulations (modulation/demodulation, channel coding/decoding, BER, and channel models)
- explain and evaluate methods for mitigating wireless channel impairments
- describe different types of equalization methods and how they solve the problem of intersymbol-interference in wireless communication
- describe the difference between forward error control coding and error control coding with feedback, and how they are used in wireless communications of today
- design trellis coded modulation for additive white Gaussian noise channels and fading channels and identify the difference in design for the two channels
- explain the benefits of advanced antenna systems in wireless communication and how can they be used
- describe various advanced techniques (CDMA, multi-user detection, OFDM etc.) and their benefits in wireless communication systems
- describe the principle of ultra-wide-band and its difference to regular radio communication.

Course contents

- Performance of digitally modulated signals on fading multi-path channels.
- Synchronization in wireless communication.
- Orthogonal Frequency Division Multiplexing (OFDM). Principle and applications.
- Trellis Coded Modulation (TCM).
- Space-time trellis coded modulation.
- Advanced antenna systems for future wireless communication.

- Error control coding with feedback: ARQ and link adaptation in wireless communication.
- Spread spectrum transmission and wireless access methods (CDMA, FH, OFDMA).
- Interference modeling in wireless communication, joint detection and interference cancellation.
- Ultra-Wide-Band (UWB) impulse radio and its promise.

Examination

- TEN1 - Examination, 7.5 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.

The exam is written.

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.