EQ2840 Information Theory and Channel Coding, Accelerated Program 7.5 credits

Informationsteori och kanalkodning, forskarförberedande

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 spring semester 2025 according to the decision of Director of First and Second Cycle Education: J-2024-2184.Date of decision: 2024-10-16

Grading scale

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

Education cycle

Second cycle

Main field of study

Electrical Engineering

Specific prerequisites

Knowledge in signal theory, 6 higher education credits, equivalent completed course EQ1220/EQ1270.

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 shall be able to

- give an introduction to the historical development and importance for the modern society of the subject
- explain the basic principles and theoretical concepts that form the basis for information theory
- formulate a mathematical model that is applicable and relevant for a given problem in the area
- use a given or individually formulated mathematical model for solving a given technical problem in the area and analyse the result and its reasonableness
- compare different algorithms and encoding techniques, put different techniques against one another and assess the suitability of individual techniques in different situations
- account for how information theoretical upper and lower bounds are formulated and proven.

Course contents

The course gives a basic introduction to information theory and channel coding with applications in statistics and digital communications.

Central concepts: entropy, mutual information, asymptotic equipartition principle and entropy for stochastic processes, data compression, source coding, channel capacity, channel coding, capacity for specific channel models with focus on discrete and Gaussian models, finite field theory, analysis and design of algebraic channel codes and network theory.

Formats: The course is presented in a series of eight seminars.

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.

Examination is a take-home examination including oral reporting.

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.