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.

Establishment

Course syllabus for EQ2840 valid from Autumn 2007

Grading scale

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

Education cycle

Second cycle

Main field of study

Electrical Engineering

Specific prerequisites

For single course students: 180 credits and documented proficiency in English B or equivalent

Language of instruction

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

Intended learning outcomes

The course provides a general introduction to the topic of Information Theory with a focus on the application of Information Theory to communications in general and on channel coding and capacity in particular.

Course contents

Outline: entropy and mutual information, the asymptotic equipartition principle, entropy for stochastic processes (entropy rate), introduction to data compression and source coding, channel capacity and coding for noisy channels, capacity for different channel models (with emphasis on discrete memoryless channels and Gaussian channels), finite field theory, design and analysis of error correcting codes (with a focus on linear block codes), introduction to network information theory

Format: Teaching the course will be based on one meeting, or seminar, per week (with about 12 meetings total, for the complete doctoral student version). The examination of the course will be based on: active participation, homework problems and, for the doctoral student version (see below), presentation/review of an article in the field. The overall emphasis is on individual off-class problem solving, based on relatively demanding homework problems. More information about these can be found here.

Two versions: The course is eligible for both undergraduate (2E5207, 5p) and doctoral (2E5316, 8p) students. The difference between the two versions of the course is in the extent and level of difficulty of the material included. With reference to the course schedule the senior undergraduate version, 2E5207, will amount to the material treated in meetings 1-8 while 2E5316 includes in addition the theoretically more demanding material corresponding to meetings 9-11 as well as a separate presentation/review of a research paper in the field.

Course literature

Main textbook: "Elements of Information Theory" by T. Cover and J. Thomas (Wiley 1991: ISBN 0-471-06259-6).

Other material used: In addition to the main textbook, parts of "The Theory of Error-Correcting Codes" by F. MacWilliams and N. Sloane (North-Holland 1977) as well as some research articles in the field will be used. Handouts will be provided.

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.

If the course is discontinued, students may request to be examined during the following two academic years.

Other requirements for final grade

Teaching the course and its examination will be based on mandatory homework problems. Solutions to homework problems are to be handed in.

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.