



FSF3704 Error Correcting Codes

7.5 credits

Felkorrigerade koder

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

Course syllabus for FSF3704 valid from Autumn 2011

Grading scale

Education cycle

Third cycle

Specific prerequisites

Courses in Linear Algebra, Elementary Combinatorics and Elementary Algebra.

Language of instruction

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

Intended learning outcomes

The goal is to give some insight in the theory of error correcting codes.

In particular, the goal is that the student shall learn some classical constructions of good e-error correcting codes and to learn some classical results in coding theory as for example the Macwilliams identities for linear and nonlinear e-error correcting codes.

Course contents

Basics in error correcting. Properties of linear codes. Shannon's theorem on the existence of good codes.

Weight distribution of the dual of a binary linear code, group characters and codes, the theorems of Macwilliams, Krawtchouk polynomials.

Perfect codes, the Golay codes and the Mathieu groups. Some elementary facts of finite geometry, codes and their related designs. Hadamard codes.

Overview of some classical constructions of error correcting codes: BCH-codes, Reed-Solomon codes, Reed-Muller codes, Quadratic-residue codes. Combining constructions of codes.

Association schemes, the Hamming scheme and the Johnson scheme. Codes in graphs.

Disposition

Reading cours.

Course literature

F .J. Macwilliams, N.J .A. Sloane, "The Theory of Error-Correcting Codes", North-Holland Mathematical Library.

Examination

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.

Lectures given by the student on the subjects included in the course, (or a selection of relevant subjects related to the course syllabus), alternatively home assignments together with an oral exam.

Other requirements for final grade

Passed oral presentation or examination.

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.