Linnæus University

Course syllabus

Faculty of Technology

Department of Mathematics

4MA424 Kodningsteori, 7.5 credits
Coding Theory

Main field of study
Mathematics

Subject Group
Mathematics

Level of classification
Second Level

Progression
A1F

Date of Ratification
Approved 2014-10-03
Revised 2022-06-13 by Faculty of Technology. Content and literature list is revised.
The course syllabus is valid from spring semester 2023

Prerequisites
4MA421 Algebraic structures II, 7.5 credits or equivalent.

Objectives

After completing the course, the student should be able to

- independently and with adequate techniques solve problems, perform calculations, and conduct lines of reasoning within the part of mathematics that is covered by the course, and to clearly communicate these solutions, calculations, and reasonings in writing
- critically, independently, and creatively identify and formulate coding theoretical problems and carry out advanced exercises within given time limits
- clearly present and discuss coding theoretical results orally as well as in writing, in accordance to an established scientific and mathematical practice.

Content

The course contains the following moments:

- Hamming distance and Hamming weight
- linear codes; generating and parity-check matrices, coset decoding
- bounds on codes; perfect codes, MDS codes
- cyclic codes, error trapping decoding
- some examples of codes, especially Hamming codes, Reed-Muller codes, BCH codes, and Reed-Solomon codes.

Type of Instruction

Lectures and seminars.

Examination

The course is assessed with the grades A, B, C, D, E, Fx or F.

The grade A constitutes the highest grade on the scale and the remaining grades follow in descending order where the grade E is the lowest grade on the scale that will result in a pass. The grade F means that the student's performance is assessed as fail (i.e. received the grade F).

The student's knowledge is assessed in the form of assignments and a project work.

Repeat examination is offered in accordance with Local regulations for courses and examination at the first and second-cycle level at Linnaeus University.If the university has decided that a student is entitled to special pedagogical support due to a disability, the examiner has the right to give a customised exam or to have the student conduct the exam in an alternative way.

Course Evaluation

During the implementation of the course or in close conjunction with the course, a course evaluation is to be carried out. Results and analysis of the course evaluation are to be promptly presented as feedback to the students who have completed the course. Students who participate during the next course instance receive feedback at the start of the course. The course evaluation is to be carried out anonymously.

Credit Overlap

The course cannot be included in a degree along with the following course/courses of which the content fully, or partly, corresponds to the content of this course: 4MA124 Coding Theory, 7.5 credits

Other

Grade criteria for the A–F scale are communicated to the student through a special document. The student is to be informed about the grade criteria for the course by the start of the course at the latest.

Required Reading and Additional Study Material

San Ling & Chaoping Xing, *Coding Theory. A First Course*, Cambridge University Press, 2004 or later. 170 (222) pages