ELEC-E7240 Coding Methods D (5 cr) spring 2022

Following the ELEC guidelines, since this course has less than 40 participants, all events (lectures, exercises, exam) will take place on campus. Note, however, that new school and university guidelines might change the situation. Any important changes will be communicated via MyCourses announcements.

Lectures

The lectures take place on Mondays 12–14 and Wednesdays 10–12 in TU2 (Maarintie 8) until 02.02 and in TU1 (Maarintie 8) starting from 07.02 and are given by Prof. Patric Östergård (patric.ostergard@aalto.fi).

Date	Topic
10.01	Introduction
12.01	Algebra I
17.01	Algebra II
19.01	Linear Codes I
24.01	Linear Codes II
26.01	Cyclic Codes
31.01	BCH and Reed-Solomon Codes
02.02	Convolutional Codes I
07.02	Convolutional Codes II
09.02	Modern Coding Methods I
14.02	Modern Coding Methods II, Channels with Feedback
16.02	No lecture (spare lecture slot)
23.02	Exam

The course literature is

[Wic] S. B. Wicker, *Error Control Systems for Digital Communication and Storage*, Prentice-Hall, Upper Saddle River, NJ, 1995.

and, for turbo and LDPC codes,

[CF] J. Castiñeira Moreira & P. G. Farrell, *Essentials of Error-Control Coding*, Wiley Chichester, UK, 2006.

Exercises

The exercises take place on Thursdays 14–16 in AS1 (Maarintie 8) and are given by Patric Östergård. The course assistant is Dr. Daniel Heinlein (daniel.heinlein@aalto.fi). The exercises consist of homeworks and tutorials. The homeworks are graded and the

total number of points is obtained from the percentage of correct solutions multiplied by 0.12 (that is, maximum is $100 \times 0.12 = 12$ points).

Date	Topic	Homework deadline
13.01	Introduction	20.01
20.01	Abstract Algebra	27.01
27.01	Linear Codes	03.02
03.02	Cyclic, BCH, Reed–Solomon Codes	10.02
10.02	Convolutional Codes	17.02
17.02	Turbo Codes, LDPC Codes	No homework

Programming Task

There will be a programming task that can give up to 3 bonus points.

Exam

The exam will be shorter than in previous years. There are two possible dates for taking the exam: 23.02.2022 and 09.05.2022.

Grading

The course is passed by returning the homeworks and taking the exam. The total number of points is $24 = 12$ (exam) + 12 (homeworks). Grading (after rounding to the closest integer):

Grade	Points
0	0–9
1	10–12
2	13–15
3	16–18
4	19–21
5	22–24

A grade of at least 1 can be raised if the programming task has been carried out and the addition of the bonus points leads to a higher grade.