EQ2850 Kodning för trådlös kommunikation, forskarför- beredande 7,5 hp

Coding for Wireless Communications, Accelerated Program

När kurs inte längre ges har student möjlighet att examineras under ytterligare två läsår.

Fastställande

Skolchef vid EECS-skolan har 2021-10-14 beslutat att fastställa denna kursplan att gälla från och med VT 2022, diarienummer: J-2021-2239.

Betygsskala

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

Utbildningsnivå

Avancerad nivå

Huvudområden

Elektroteknik

Särskild behörighet

This course is a continuation to the undergraduate courses

- EQ2310 Digital Communications
- EQ2410 Advanced Digital Communications

Among these, EQ2310 is a required prerequisite. Having completed EQ2410 is helpful and therefore recommended, but not a formal requirement. In addition, the following courses are helpful, but not necessary, prerequisites

- EQ2830 Detection and Modulation Theory
- EQ2840 Information Theory and Channel Coding

Undervisningsspråk

Undervisningsspråk anges i kurstillfällesinformationen i kurs- och programkatalogen.

Lärandemål

- In order to pass the course, the student should be able to:
- Describe the construction, features and operation of modern coding schemes such as low-density parity-check codes and Turbo codes, and decoding algorithms such as the sum-product algorithm, the min-sum algorithm, and the forward-backward algorithm.
- Formulate and use a factor graph representation for describing decoding problems and design of codes on graphs.
- Apply analytical tools, such as density evolution and extrinsic information transfer charts, for performance evaluation and design of modern coding schemes.

To qualify for a higher grade the student should meet the intended learning outcomes required to pass the course, and furthermore be able to:

- Design and compare different modern coding strategies applied to particular communications scenarios, using appropriate analytical tools for performance analysis, and select a justified best choice of coding scheme.
- Explain important theoretical concepts as well as the impact of code properties on the features of the analytical analysis tools mentioned above.

Kursinnehåll

The course is focused on **modern error control coding strategies for wireless communications**, with material building on fundamental principles from information theory, communication theory, detection and estimation, and signal processing. A brief outline of the course contents is as follows.

- Factor graphs
- Low-density parity-check (LDPC) codes for binary erasure channels
- LDPC codes for binary memoryless symmetric channels
- Density evolution and extrinsic information transfer (EXIT) charts for LDPC codes
- Convolutional codes and trellis coded modulation
- Turbo codes and generally concatenated codes with iterative decoding
- Bit-interleaved coded modulation and Turbo trellis-coded modulation
- Code design for fading channels

- Rate-compatible coding schemes and rateless coding

Examination

- TEN1 - Tentamen, 7,5 hp, betygsskala: A, B, C, D, E, FX, F

Examinator beslutar, baserat på rekommendation från KTH:s handläggare av stöd till studenter med funktionsnedsättning, om eventuell anpassad examination för studenter med dokumenterad, varaktig funktionsnedsättning.

Examinator får medge annan examinationsform vid omexamination av enstaka studenter.

Övriga krav för slutbetyg

Final grade is based on the accumulated score of 8 homework assignments (7.5 credits)

Etiskt förhållningssätt

- Vid grupparbete har alla i gruppen ansvar för gruppens arbete.
- Vid examination ska varje student ärligt redovisa hjälp som erhållits och källor som använts.
- Vid muntlig examination ska varje student kunna redogöra för hela uppgiften och hela lösningen.