EQ2840 Informationsteori och kanalkodning, forskarförberedande 7,5 hp

Information Theory and Channel Coding, Accelerated Program

Fastställande

Kursplan för EQ2840 gäller från och med VT19

Betygsskala

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

Utbildningsnivå

Avancerad nivå

Huvudområden

Elektroteknik

Särskild behörighet

För fristående kursstuderande: 180hp samt engelska B eller motsvarande

Undervisningsspråk

Undervisningsspråk anges i kurstillfällesinformationen i kurs- och programkatalogen.

Lärandemål

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.

Kursinnehåll

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.

Kurslitteratur

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 - 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.

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

Övriga krav för slutbetyg

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

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.