



EQ2410 Avancerad digital kommunikation 6,0 hp

Advanced Digital Communications

Fastställande

Kursplan för EQ2410 gäller från och med HT07

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 student is required to show the following skills to pass the course:

- Identify and describe different techniques in modern digital communications with applications to wireless transmission, in particular in receivers and equalization, diversity, spread spectrum techniques, OFDM, coding for wireless communications, and CDMA and multiuser systems.
- Identify and describe different standardized technologies in the field, in particular GSM, UMTS/WCDMA and different WLAN standards.
- Describe and motivate the fact that the implementation and development of modern communication technology, in particular in wireless communications, requires mathematical modeling and problem solving.
- Apply mathematical modeling to problems in wireless digital communications, and explain how this is used to analyze and synthesize methods and algorithms within the field.
- Formulate a mathematical model which is applicable and relevant in the case of a given problem.
- Use a mathematical model to solve a given engineering problem in the field, and analyze the result and its validity.

To acquire a higher grade, the student is in addition required to show the following skills:

- Identify and describe different techniques in modern wireless communications, compare different techniques and judge the applicability of different techniques in different situations.
- Formulate advanced mathematical models which are applicable and relevant in the case of a given problem. When explicit assumptions are missing, the student should be able to judge and compare different possibilities and make own relevant assumptions.
- Use a mathematical model to solve a given demanding engineering problem in the field, and analyze the result and its validity.

Kursinnehåll

The course is a second course to EQ2310 Digital Communications and focuses on advanced wireless transmission.

Bandlimited Channels: Intersymbol interference, equalization, receiver algorithms.

Fading Radio Channels: Multipath propagation. Flat and frequency-selective fading. Fast and slow fading. Random channel models. Signal design for radio channels. Diversity. Modulation. Coding.

Spread Spectrum Techniques: Introduction to spread spectrum. Direct sequence and frequency hopping. Spreading sequences, receivers. Robustness toward jamming. RAKE-receivers.

OFDM: Introduction to OFDM. Frequency-domain equalization. High bit-rate transmission. Implementation aspects.

Multiuser Communications: Multiuser systems with focus on CDMA. The near-far problem. Power control, multiuser detection, comparison between FDMA, TDMA and CDMA.

Kurslitteratur

John G. Proakis "Digital Communications".

Examination

- TEN1 - Tentamen, 6,0 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 enskilda studenter.

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

Övriga krav för slutbetyg

Godkänd skriftlig tentamen (TEN1; 6 p).

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.