IK2507 Trådlösa kommunikationssystem 7,5 hp

Wireless Communication Systems

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

Fastställande

Kursplan för IK2507 gäller från och med VT15

Betygsskala

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

Utbildningsnivå

Avancerad nivå

Huvudområden

Elektroteknik

Särskild behörighet

Högskolestudier motsvarande minst 120 hp inom teknik eller naturvetenskap samt Engelska A.

Undervisningsspråk

Undervisningsspråk anges i kurstillfällesinformationen i kurs- och programkatalogen.

Lärandemål

The course aims at providing basic knowledge about problems and design approaches in wireless communication systems. This includes engineering models in radio propagation and the application of antennas to wireless communication. An introduction to spectrum resource management issues is also given in the course. Upon completion of the course, the student will be able to:

- characterize fading multi-path radio channels in terms of Doppler spectrum, coherence time, power delay profile, and coherence bandwidth.
- distinguish the difference between large-scale fading and small-scale fading.
- describe and explain the effects of fading multi-path channels on the link performance of wireless communication systems.
- provide possible solutions to the problem of signal fading in wireless communication links. Describe different types of diversity and how they improve performance for mobile radio channels.
- apply propagation models and design basic radio communication links with respect to signal-to-noise ratio and outage probabilities. Special emphasis is given to propagation models for mobile and portable wireless communication.
- plan and analyze simple wireless networks in terms of coverage and capacity.
- Demonstrate the ability to independently acquire knowledge about the state of the art in research and development for wireless systems

Kursinnehåll

- Introduction to radio communication, the history of radio and its evolution throughout the years, the radio frequency spectrum.
- Radio wave propagation and modeling, free space propagation model, plane earth model, radio wave reflections and diffractions.
- Antenna systems for wireless communication.
- Radio link design: Path loss modeling and link budget calculations.
- Representation of radio communication signals and systems.
- Radio channel modeling: Time/frequency domain characterization of fading multi-path channels. Discrete representation of fading multi-path channels.
- Techniques to combat fading multi-path channels. The principle of Diversity in wireless communication, combining methods.
- Introduction to wireless networks. Multi access methods, principle of frequency reuse and channel allocation. Elementary capacity analysis of wireless networks.

Kursupplägg

Undervisningsspråk: Engelska

Rekommenderad förkunskap: IK1501 Communication Systems

Kurslitteratur

Principles of Wireless Communications, Lars Ahlin, Jens Zander, and Ben Slimane Upplaga: Förlag: studentlitteratur År: 2006 ISBN: 91-44-03080-0

Examination

- LAB1 - Laborationer, 1,5 hp, betygsskala: P, F
- 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 enstaka studenter.

Betygsskala: A/B/C/D/E/Fx/F

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.