



FEM3320 Projektkurs i trådlösa experiment 12,0 hp

Project Course in Wireless Experimentation

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

Fastställande

Kursplan för FEM3320 gäller från och med VT13

Betygsskala

Utbildningsnivå

Forsknivå

Särskild behörighet

A documented background in wireless systems similar to the wireless masters program at KTH. One or several publications on topics within wireless communications is preferable.

Undervisningsspråk

Undervisningsspråk anges i kurstillfällesinformationen i kurs- och programkatalogen.

Lärandemål

After the course, the student should be able to:

- design a wireless system with a physical layer and medium access layer, detailed enough that the performance can be tested on a small-scale wireless testbed including assessing the performance of specific features of the system,

- implement the signal processing blocks in C++ that performs the signal processing associated with the system (using available tools such as IT++),
- understand the major forms of RF signal impairments in real-world wireless systems,
- analyze the performance of their system and compare measurements against theory,
- be able to handle a testbed and make measurements using RF signal generators and spectrum analyzers.

Kursinnehåll

- Overview of some wireless testbeds and their purpose
- Our hardware setup
 - Units, cables, signals, levels, antennas, control, frequency adjustment.
- The four_multi software framework.
 - installing, learning IT++, implementation of a new scheme, necessary files, compiling, the executables, debugging, working with real signals, inter-node communications, thread safety.
- Coding and modulation using four_multi:
 - Adaptive coding and modulation (AMC), OFDM, channel state information pilots.
- The example code for the single-input single-output OFDM based implementation called SISO AMC OFDM.
- The example for interference and coordinated multipoint called IA1.
- Exercise on RX and TX modules (XERXES).
- Simulation and experimental evaluation of the example SISO AMC OFDM.
- Development of a MIMO version of SISO AMC OFDM.
- Simulation and experimental evaluation of SISO AMC OFDM.
- Development of a new scheme (preferably related to the students research).
- Simulation of the new scheme.
- Experimental evaluation of the new scheme.
- Presentation of the new scheme, its implementation and simulation and measurement results in a conference-style scientific article.

Kursupplägg

Lectures, simulation exercises, lab exercises, oral student presentations, project work, report writing.

Kurslitteratur

- Homepage of four_multi including its user manual.
- XERXES lab description.
- Homepage of IT++.
- Articles with academic implementations of wireless systems.

Utrustning

The ACCESS wireless testbed will be used and provided to the students. However, the students will also need access to a personal computer with Ubuntu operating system.

Examination

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

- Slides prepared for presenting the first three parts of the four_multi users manual.
- XERXES lab completed.
- Labs on SISO AMC OFDM completed.
- Code for the MIMO developed version of SISO AMC OFDM, and simulation and measurement from it.
- Code for the new approach of the student.
- Measurement results from the new approach.
- Conference style paper describing the new approach, its implementation and a comparison of theoretical and measurement results.

Etiskt förhållningssätt

- Vid grupperbete 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.