IL2219 Radio Electronics 7.5 credits

Radioelektronik

This is a translation of the Swedish, legally binding, course syllabus.

Establishment

Course syllabus for IL2219 valid from Spring 2019

Grading scale

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

Education cycle

Second cycle

Main field of study

Electrical Engineering

Specific prerequisites

120 university credits (hp) in engineering or natural sciences and documented proficiency in English corresponding to English A.

Language of instruction

The language of instruction is specified in the course offering information in the course catalogue.

Intended learning outcomes

This course aims at familiarizing the student with modern radio electronic devicesand systems and to provide a relevant background to the common mobile applications standards of today. A focus will be put on knowledge of integrated radio circuit building blocks so that at the student at end of the course is well equipped to pursue either an industrial or academic career in the area. The course will prepare the student for diploma thesis work in the area of Radio Electronics, as he will be further trained in radio design beyond the knowledge gained in analog courses.

The Software Radio part of the course is hands-on. It teaches students basic principles of how to develop and implement digital communication systems on software defined radio platforms by comprehensive integration of theory and practice. After finalizing the course the students will be able to:

- identify all relevant components of a digital transceiver chain and their relationship
- implement algorithms for common digital transceiver tasks
- identify performance and hardware demands of relevant digital transceiver components and assess the feasibility of their implementation in software through practical testing
- assess the performance of different algorithms in a digital communication system

Course contents

The course will start with an introduction to wireless (radio) technology and put the subject in its context. Basic concepts in rf design nonlinearity, noise and sensitivity and transformers will be covered. Modulation techniques for mainly analog amplitude and frequency but also basic concepts for digital modulation and power efficiency. Different access techniques such as time, frequency and code will be discussed as well as different modern standards of mobile applications such AMPS, CDMA, TDMA, GSM, DECT etc. Architectures for receivers including heterodyne, homodyne, image-reject, digital-IF and sub-sampling. Transmitt architectures with direct-conversion and two step transmitters. Case studies will be discussed. Several building blocks will be discussed in detail. Important passive RLC circuits, tanks, networks, impedance transformers. The Software Radio part of the course is hands-on. It teaches students basic principles of how to develop and implement digital communication systems on software defined radio platforms by comprehensive integration of theory and practice.

Course literature

RF Microelectronics, Behzad Razavi
Upplaga: 2nd edition, Förlag: Pearson, Prentice-Hall
År: 2012, ISBN: 0-13-283941-5

Examination

- TEN1 - Examination, 6.0 credits, grading scale: A, B, C, D, E, FX, F

- LAB1 - Laboratory Course, 1.5 credits, grading scale: P, F

Based on recommendation from KTH's coordinator for disabilities, the examiner will decide how to adapt an examination for students with documented disability.

The examiner may apply another examination format when re-examining individual students.

If the course is discontinued, students may request to be examined during the following two academic years.

Other requirements for final grade

Laboratory work (LAB1; 1,5 hp)
Written examination (TEN1; 6 hp)

Grading scale: A/B/C/D/E/Fx/F

Ethical approach

- All members of a group are responsible for the group's work.

- In any assessment, every student shall honestly disclose any help received and sources used.

- In an oral assessment, every student shall be able to present and answer questions about the entire assignment and solution.