IL2238 Fundamentals of Integrated Electronics 7.5 credits

Integrerad elektronik

Course syllabus for IL2238 valid from Spring 16

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

Grading scale: A, B, C, D, E, FX, F
Education cycle: Second cycle
Main field of study: Electrical Engineering

Intended learning outcomes

The aim of this course is to provide the fundamental concepts, principles and techniques for designing integrated electronic systems, which include analog, radio, mixed-signal and digital blocks. Most common integration approaches are given using examples. The course is also intended to provide knowledge and experience in the design of fundamental analog circuits. Experience with the professional tools used to design integrated electronics is acquired.

At the end of this course the student will be able to

- describe the challenges and opportunities of integrated electronics
- explain the fundamental concepts of integrated electronic systems (containing analog, radio, mixed-signal and digital blocks)
- explain the on/off-chip design issues
- understand and explain the theory and operation of fundamental electronic devices and circuits
- perform small and large signal analysis
- design, simulate and analyze fundamental CMOS analog circuits, such as amplifiers, which are used in electronic systems
- evaluate the performance of fundamental analog circuits
- use professional CAD tools for designing and evaluating integrated circuits.

Course main content

The course will focus on the following topics:

Introduction to integrated electronic systems; Integration approaches and issues; MOS and BJT device models; basic analog and digital blocks; Amplifiers and curent mirrors; Frequency response; Noise; Feedback; Stability and frequency compensation; Nonlinearity and mismatch; Layout techniques.

Disposition

This course comprises:

- lectures (12 x 2hours)
- tutorials and exercises (6 x 2hours).

The exercises complement the lectures by detailed analysis of some examples, and the tutorials allow students to learn circuit design, simulation, analysis and evaluation techniques using professional CAD tools and standard CMOS process technologies and design kits.

Language of instruction

Language of instruction is specified in the course offering information in the course and programme directory.

Eligibility

Basic courses in circuit theory, signal processing, analog and digital circuits.

Literature

Behzad Razavi, "Design of Analog CMOS Integrated Circuits", McGraw-Hill Higher Education, 2001

Jan M. Rabaey, Anantha Chandrakasan, Borivoje Nikolic, "Digital Integrated Circuits", Prentice Hall, 2nd Edition, 2003

Examination

- PRO1 - Project, 3.0 credits, grading scale: A, B, C, D, E, FX, F
- TEN1 - Examination, 4.5 credits, grading scale: A, B, C, D, E, FX, F

The project consists of designing a fundamental analog circuit. The results of this project include a written report and an oral presentation, where the design is presented and disscussed.

Requirements for final grade

The grade for the course is calculated as a weighted average where the grade E-A are given a value of 1-5. Roundhalfs up.