IE1330 Analog Electronics 7.5 credits

Analog elektronik

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

Establishment

Course syllabus for IE1330 valid from Autumn 2008

Grading scale

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

Education cycle

First cycle

Main field of study

Electrical Engineering, Technology

Specific prerequisites

IF 1330 Electrical principles

Language of instruction

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

Intended learning outcomes

The student could after the course understand properties of analogue electronic circuits and how they could be designed with operational amplifiers and transistors.
The student could after the course design, simulate, build and test a low frequency amplifier. After the course the student is able to

- define and calculate gain, input and output resistance for amplifiers with operational amplifiers and basic transistor amplifiers
- determine transfer function for frequency dependent amplifiers, sketch the bode plot and determine cutoff frequencies
- understand the operation and datasheets for operational amplifiers, diodes and transistors and choose suitable components for a certain application
- analyse effects of input offset voltage, bias currents and determine if they need to be compensated
- defineterms of feedback systems: open loop gain, closed loop gain, loop gain, feedback ratio, stability margins
- explain why an amplier with feedback could be unstable and explain the principle of oscvillators
- design simple RC-oscillators
- understand the function of class B power amplifiers, calculate power and design heat sinks
- verify designs with simulation tools
- build a protype and evaluate its performance with measurements
- make a written documentation and an oral presentation of the design

Course contents

Analogue parts of a design from a system perspective: gain, input resistance, output resistance, cut off frequencyOperational amplifiers and their characteristics. Amplifiers designed with operational amplifiers.RC-filters and bode plots. Principles of feedback and stability problems in feedback systems. Oscillators.Diodes and transistors. Diode circuits. Amplifier circuits with bipolar transistors: common emitter, common collector and differential amplifiers. Common mode, differential mode, CMRR.DC bias circuits. Current mirrors.Transistor as a switch.Power amplifiers (class AB, B), power calculation and cooling.Use of circuit simulators (PSpice).

Examination

- ANN1 - Examination, 7.5 credits, grading scale: A, B, C, D, E, FX, 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

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

Examination (ANN1; 7,5hp)ANN1 consists of three partial exams during the course.

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.