IE1206 Embedded Electronics 7.5 credits

Inbyggd elektronik

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

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

Establishment

Course syllabus for IE1206 valid from Spring 2014

Grading scale

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

Education cycle

First cycle

Main field of study

Technology

Specific prerequisites

Required:IE1204 Digital Design, IS1200 Computer Hardware Engineering
Recommended: SF1624 Algebra and Geometry, SF1625 Calculus in One Variable

Language of instruction

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

Intended learning outcomes

This course provides basic knowledge of circuit theory and electronics, with elements of sensor technology. It also provides knowledge of the various devices that can be found in a microcontroller and how these are supposed to be used, in order to connect sensors and actuators.

A series of laboratory sessions where students work with sensors and actuators connected to a microcontroller, will be used as a framework. Before the labs the relevant methods of analysis and synthesis of electrical networks for interfacing between sensors and the microcontroller, will be covered, along with examples of how the microcontroller software can be designed to analyse sensor signals and controlling actuators.

During the course, the students will work in small groups to solve a larger programming task. It will be reported by a demonstration and documented in a report.

This means that the student after completing the course will be able to:

- describe the architecture and features of a small microcontroller, describe and be able to use it's IO devices, designing software for analysing sensor signals and controling actuators.
- analyze and explain electrical networks for adapting signals from sensors, describe the characteristics of passive components, such as resistors, capacitors and inductors.
- use Kirchhoff's laws, two-port theorem and the superposition principle, analyze transients in simple kapacitive and inductive circuits.
- use phasordiagrams and the complex method to analyze AC-circuits as the AC resonant circuit.
- describe the characteristics of, and be able to use, some common sensors and actuators.

Course contents

• The microcontroller as an embedded system component
• Input and output devices inside the microcontroller
• Resistive, inductive and capacitive sensors and various actuators
• Analog to digital converters, comparators, measurement of time and frequency
• DC and AC voltage, DC and AC current, Ohm's and Kirchhoff's laws
• Series connection, parallel connection, voltage divider
• Resistance, inductance, capacitance, transients, phasor diagrams, knowledge of the complex method
• Electronic components, analog comparator, and transistor
• Laboratory
• A larger microcontroller programming task that is performed in small groups

Examination

- ANN1 - Programming Task, 2.0 credits, grading scale: P, F

- INL1 - Hand in Exercises, 1.0 credits, grading scale: P, F
- LAB1 - Laboratory Exercises, 2.5 credits, grading scale: P, F
- TEN1 - Written Exam, 2.0 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.

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.