



MF1016 Basic Electrical Engineering 9.0 credits

Elektroteknik

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 MF1016 valid from Autumn 2010

Grading scale

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

Education cycle

First cycle

Main field of study

Technology

Specific prerequisites

CMAS2 (M2): 5B1132, 5B1133 /SF1624,SF1625, SF1626 Matematik

CDEPR2 (P)2:5B1132,5B1133 /SF1618,SF16219 Matematik

CINEK2 (I2):5B1135, 5B1136 /SF1644,SF1646, SF1645 Matematik

CFATE3 (T3): 5B1132, 5B1133 /SF1624,SF1602, 1603 Matematik

Language of instruction

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

Intended learning outcomes

After this course the student should be able to

- make a DC or a AC or a first order transient analysis of a simple electric circuit.
- Choose the size of an electrical machine with a timevarying load (torque).
- Estimate the temperature in an electric machine after changing load (thermal transient calculation).
- Calculate the speed, torque, power, current and voltage in different parts of an electrical motordrive (consisting of mechanical load, electric machine and drive), at constant speed and at acceleration (retardation).
- Use a microcontroller to solve simple tasks e.g. control the voltage to an electrical machine
- Design a digital network for solving a combinatorial problem.
- Design a digital network for solving a sequential problem.
- Estimate deviations in measurements due to the the influence of the instrument on the measurement object and due to the accuracy of the instrument..
- Connect an electric circuit from a description or a diagram.
- Connect common measurement instruments to a electric circuit and to make measurements with the instruments.
- Experimentally determine the current-voltage characteristic of an apparatus or component.
- View if electrical apparatus or components could be wired together.

Course contents

Electrical circuits: DC, AC and transients. Analogy between electrical and mechanical quantities.

Electrical measurements: Measureing with multimeter and oscilloscope. Use of LabVIEW

Digital electronics and microcontrollers: Transistors in digital applications. Analysis and synthesis of combinatorial and sequence cirquits. The functionality of a microprocessor and a microcontroller. Use of microcontrollers in simple applications. Analog circuits for signalcondition of sensorsignals before ADC (analog to digital conversion). Examples of sensors such as encoders and strain gauges.

Electrical motordrives: Single- and three- phase systems. Theory and properties of DC machines and PM synchronous machines. Principles for speedcontrol of electrical machines. Mechanical and thermal transients in electrical machines. Choice of machine size for time varying mechanical loads. Power electronics and drive units for machines.

Disposition

Period 3, 4
Lectures 24h
Tutorials 28h
Laboration 22h

Course literature

Elektroteknik (Institution)

Examination

- INL1 - Assignments, 3.0 credits, grading scale: P, F
- LAB1 - Laboratory Work, 3.0 credits, grading scale: P, F
- TEN1 - Written examination, 3.0 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.

Other requirements for final grade

Written exam (TEN1; 3 cr)
Lab work (LAB1; 3 cr)
Assignments (INL1; 3 cr).

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.