Electronics and Measurement Technology

Programme course

8 credits

Elektronik och mätteknik

TSTE05

Valid from: 2017 Spring semester

Determined by
Board of Studies for Electrical Engineering, Physics and Mathematics

Date determined
2017-01-25

Main field of study
Electrical Engineering, Applied Physics, Physics

Course level
First cycle

Advancement level
G1X

Course offered for
- Biomedical Engineering, M Sc in Engineering
- Applied Physics and Electrical Engineering, M Sc in Engineering
- Physics, Bachelor´s Programme
- Mathematics, Bachelor´s Programme
- Applied Physics and Electrical Engineering - International, M Sc in Engineering

Entry requirements
Note: Admission requirements for non-programme students usually also include admission requirements for the programme and threshold requirements for progression within the programme, or corresponding.

Prerequisites
Basic knowledge in mathematics e.g. algebra, dealing with complex numbers and powers of ten. Basic study technigues.

Intended learning outcomes

The aim of the course is:

- to give a theoretical basis for analysis and synthesis of passive and active analog circuits.
- to give knowledge and ability in analysis of such circuits.
- to give ability in elementary amplifier construction.
- to give basic knowledge and abitlity in measurement technology.

After passing the course the students should be able to:

- compute current, voltage and power in general dc- and ac- circuits with structured methods.
- determine Q-point for transistors in amplifier stages.
- determine small signal input and output resistance and voltage gain for a given amplifier.
- determine voltage gain for circuits with operational amplifiers.
- use a simulation program for analysis of analog circuits.
- determine parameters for active filters with given cutoff frequencies.
- verify, through simulation and with hardware, that a filter reach its requirements.
- fullfil a simple design task from specification to design in hardware.
- use different types of instruments in measuring electrical quantities.
- make descriptions of different types of problems in measuring, and telling how to avoid those
- make descriptions of measurement disturbancies, their reasons and methods to reduce them.

Course content

Basic laws and relations. Node-voltage analysis. Sinusoidal steady-state analysis. Phasors. Transformers. Power. Resonance circuits. Maximum power transfer. Introduction to filter theory. Diode circuits.
Amplifier technology. Calculation of Q-point. Small signal analysis. Operational amplifier. Logarithmic units for gain.
Measurement technology: Measurements of current, voltage, impedance and power. The oscilloscope. Probes. Electrical disturbances, grounding- and shielding.

Teaching and working methods

The course consists of lectures and, in connection with these, exercises and laboratory work.

Examination

LABB	Laboratory work IFM	1.5 credits	U, G
LABA	Laboratory work ISY	1.5 credits	U, G
UPGA	Home assignments	5 credits	U, 3, 4, 5

The examination part LABB consists of not only three laborations, but also a home exam about measurement technology.

Grades

Four-grade scale, LiU, U, 3, 4, 5

Other information

Supplementary courses: Project Course in Electronics, Signals and Stems, Analog Circuits.

Department

Institutionen för systemteknik

Director of Studies or equivalent

Tomas Svensson

Examiner

Mikael Olofsson

Course website and other links

http://www.isy.liu.se/edu/kurser.html

Education components

Preliminary scheduled hours: 82 h
Recommended self-study hours: 131 h

Course literature

Additional literature

Books

Söderkvist Sune, *Kretsteori & Elektronik*
Söderkvist Sune, *Kretsteori & Elektronik, övningsbok*

Compendia

Other

Common rules

Regulations (apply to LiU in its entirety)

The university is a government agency whose operations are regulated by legislation and ordinances, which include the Higher Education Act and the Higher Education Ordinance. In addition to legislation and ordinances, operations are subject to several policy documents. The Linköping University rule book collects currently valid decisions of a regulatory nature taken by the university board, the vice-chancellor and faculty/department boards.

LiU's rule book for education at first-cycle and second-cycle levels is available at http://styrdokument.liu.se/Regelsamling/Innehall/Utbildning_pa_grund-_och_avancerad_niva.