

Measurement Technology

Programme course

6 credits

Mätteknik

TFMT14

Valid from: 2017 Spring semester

Determined by

Board of Studies for Chemistry, Biology
and Biotechnology

Date determined

2017-01-25

Main field of study

Biotechnology, Electrical Engineering

Course level

First cycle

Advancement level

G2X

Course offered for

- Engineering Biology, 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

Calculus, Electric Circuits, Engineering Mechanics, Physics,

Intended learning outcomes

To provide an overview of principles and methods of modern measurement technology. In the course the measurement of both electrical and non-electrical signals are treated. After the course the student should be able to:

- explain simple theories behind measurements of current and voltage of electrical circuits, DC and AC, with multimeter and oscilloscope, and perform such measurements.
- explain the detection principle of perform measurements with some physical and chemical sensors
- explain components and functions in a computerized measurement system including; sensors, sensor interfaces, digitizing, data transmission, data analysis and data presentation
- implement numeric calculations and simulations related to the concepts in TFMT14
- demonstrate the ability to calculate the quantitative aspects related to the concepts in this course.

Course content

Measurements of electrical properties with multimeter and oscilloscope. Components and functions of a measurement system; sensor, signal conditioning, linearization, signal transmission, A/D conversion, presentation, measurement data acquisition and treatment. Tools for measurements and data treatment, Electrical disturbances and noise. Sensors for measurement of important process parameters such as temperature, flow, pressure and level. Biological and optical methods, chemical sensors, biosensors, semiconductor sensors, micromechanical sensors. Quality assurance of measurement data, calibration and traceability. Measurement data treatment and uncertainty. Simulation and numerical calculation tools.

Teaching and working methods

Lectures, problem solving tutorials and laboratory exercises

Examination

LAB2	Laboratory Work	2 credits	U, G
TEN1	Written examination	4 credits	U, 3, 4, 5

Grades

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

Department

Institutionen för fysik, kemi och biologi

Director of Studies or equivalent

Magnus Boman

Examiner

Daniel Filippini

Education components

Preliminary scheduled hours: 48 h

Recommended self-study hours: 112 h

Course literature

Alan S. Morris, Measurement and Instrumentation Principles, Butterworth-Heinemann 2001 (<http://www.freeengineeringbooks.com/instrumentation-books-download/Measurement-and-Instrumentation-Principles.php>)
Laborations-PM

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://stydokument.liu.se/Regelsamling/Innehall/Utbildning_pa_grund-_och_avancerad_niva.