Chemical Sensor Systems

Programme course

6 credits

Kemiska sensorsystem

TFMT19

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
Applied Physics, Physics

Course level
Second cycle

Advancement level
A1X

Course offered for
- Applied Physics and Electrical Engineering, M Sc in Engineering
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- Physics and Nanoscience, Master's programme
- Biomedical Engineering, Master's programme
- Engineering Biology, M Sc in Engineering
- 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 courses in physics and electronics

Intended learning outcomes
To provide an insight in the function and design of modern measurement system, based on chemical sensors, including all various aspects ranging from the sensor principle to the application. The course will provide knowledge in

1. The basic detection mechanism of the most common chemical sensors
2. Data collection routines for chemical sensors
3. Drift compensation algorithms for chemical sensors
4. The electronics for chemical sensors
5. Examples of (commercial) chemical- and biosensor systems
6. Basic knowledge about taste and smell senses (of human beings)
7. Basic knowledge about sample handling and treatment

Course content

Measurement systems are studied in detail from sensor principle to application. The systems are chosen from the current research at the department and from industry and may e. g. be the "electronic nose" and the "electronic tongue" or biosensor systems based on surface plasmon resonance, QCM devices, the computer screen technology or a blood monitoring device for diabetes. As an introduction a short and brief overview of measurement technology, with emphasis on odor measurements, is given. The measurement system is then studied with respect to

1. overview and basics of chemical sensor science
2. design of the system, read-out electronics, amplifiers
3. signal processing, linearization, filtering, noise
4. data acquisition and data presentation
5. drift compensation algorithms
6. sample handling
7. smell and taste as scientific areas
8. applications.

Teaching and working methods

Lectures and laboratory work (3 x 2 hours) on sensor principles and applications. A number of guest lecturers are invited to present special topics. Visits to a research laboratory and to companies, which develops sensor systems, may be included.

Examination

UPG2	Optional written assignment for higher grade	0 credits	U, 3, 4, 5
UPG1	Hand-in exercises and quizzes	5 credits	U, 3, 4, 5
LAB1	Laboratory work	1 credits	U, G

Hand-in exercises and quizzes will show that the students have understood the important parts of the course and that they to some extent are able to use the acquired knowledge. Home exercises give grade U, 3 or 4. An extra report, a review of a number of chapters from a book or scientific papers, may increase the grade one step.

Grades

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

Department

Institutionen för fysik, kemi och biologi

Director of Studies or equivalent
Magnus Boman

Examiner
Jens Eriksson

Course website and other links
https://www.ifm.liu.se/edu/coursescms/TFMT19/

Education components
Preliminary scheduled hours: 60 h
Recommended self-study hours: 100 h

Course literature
Kopior på förläsningsmaterial, bokkapitel, och artiklar distribueras under kursen

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.