Introduction to Biosensor Technology

Programme course

6 credits

Introduktion till biosensorteknik

TFYA62

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, Biomedical Engineering

Course level

First cycle

Advancement level

G2X

Course offered for

- Biomedical Engineering, M Sc in Engineering
- Industrial Engineering and Management - International, M Sc in Engineering
- Industrial Engineering and Management, 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

Biochemistry and Cell Biology, Materials for Biomedical Engineering

Intended learning outcomes

The purpose of the course is to provide a broad introduction to biosensor technology including:

- Working principle of the biosensors,
- Biosensors classification,
- Use of biological macromolecules as sensing elements,
- Presenting how engineering and biology can be used to perform diagnosis.

After finishing the course the student should be able to:

- Describe the working principles of biosensors,
- Explain the nature and mechanism of the biorecognition event,
- Describe and explain the main transduction techniques used in biosensor technology,
- Evaluate a sensor based on standard performance criteria and appropriateness for a given application.

Course content

- Introduction to biosensors,
- Biorecognition elements,
- Transduction principle,
- Surface functionalization in biosensors,
- Surface plasmon resonance biosensors (Biacore),
- Catalytic biosensors (glucosensor),
- Antibodies based biosensors,
- DNA based biosensors,
- Nanomaterial in biosensor technology,
- Microsystem working principles and their application to biosensor technology,
- Analytical parameters for sensor evaluation.

Teaching and working methods

The course includes tutorial sessions, seminars, lectures, group works and laboratory work.

Laboratory work:
Laboratory tasks/demonstrations will be held at the IFM: students will be asked to prepare, for each demonstration/exercise, a report or to answer to a questionary.
Group work
Students will be divided in teams, and each team will be assigned a research article. Each team will be asked to prepare a presentation (to be present in front of the class).
Moreover each student will be asked to prepare a individual assay to demonstrate her/his understanding of the assigned article.

Examination

UPG1	Group work of exercise	U, G	2.5 credits
LAB1	Laboratory work and reports	U, G	1 credits
TEN1	Written tests	U, 3, 4, 5	2.5 credits

Grading will be based on final written test, laboratory reports and group work exercise. When all assignments are approved a final grade will be calculated as a weighted mean where the written examination gives 60% of the final mark and the group work will contribute with 40%.

Grades

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

Department

Institutionen för fysik, kemi och biologi

Director of Studies or equivalent

Magnus Boman

Examiner

Edwin Jager

Course website and other links

http://www.ifm.liu.se/edu/coursescms/tfya62/

Education components

Preliminary scheduled hours: 80 h
Recommended self-study hours: 80 h

Course literature

Föreläsningsanteckningar, artiklar och senare bestämt litteratur Handbook of Biosensors and Biochips; Robert S. Marks, Christopher R. Lowe, David C. Cullen, Howard H. Weetall, Isao Karube, (2007) Wiley (e-book). Chemical sensors and biosensors; Brian R.

Eggins (2002) Wiley (tillgänglig i biblioteket). Biosensors. The Practical Approach Series, Cooper, Jonathan M.; Cass, Anthony E. G. (2004), Volume 268 (tillgänglig i biblioteket).

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.