

Materials for Biomedical Engineering

Programme course

8 credits

Material för medicinsk teknik

TFYA63

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

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. Anatomy and Physiology

Intended learning outcomes

After completion of the course the student should be able to:

- describe different types of materials used for biomedical applications as well as their properties making them useful as biomaterials, from nano- to macro level
- give examples of commonly used materials for biomedical applications
- describe and explain how cells and tissues are affected by the introduction of a foreign material
- describe in which way nano probes may be used in biomedical applications
- explain and be able to apply some methods for characterization of biomaterials and their interaction with cells and tissue.
- be aware of and able to describe some commonly used strategies for conjugation of biomolecules to materials and the involved chemical interactions. In addition, to have knowledge about some selected biochemical concepts often utilized in biomaterial and biosensor science.

Course content

Materials commonly used for medical applications (biomaterials), demands on a material intended for biomedical use, surface modification of biomaterials and methods for studying biomaterials and their interaction with its surroundings. Biocompatibility, cell/tissue biomaterial interaction, protein adsorption, coagulation and complement activation, wound healing, inflammation, tissue engineering. Nano probes as tools in medicine and imaging. Drug delivery, biomaterial induced pharmacological modulation of tissue responses.

Selected basic chemistry with focus on conjugation chemistry, biochemistry and interaction chemistry. This part of the course is preparatory for the rest of the course as well as for "Introduction to Biosensors".

Teaching and working methods

Lectures and laborations. Preparation of a poster

Examination

KTR1	Written test	2 credits	U, G
LAB2	Laboratory work	2 credits	U, G
TEN2	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

Caroline Brommesson

Course website and other links

<http://www.ifm.liu.se/edu/coursescms/TFYA63/>

Education components

Preliminary scheduled hours: 52 h

Recommended self-study hours: 161 h

Course literature

Essential Biomaterials Science av David Williams 2014 Cambridge University Press. ISBN 978-0-521-89908-6 Utvalda vetenskapliga artiklar

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.