Materials and Nanotechnology

Programme course

6 credits

Materials and Nanotechnology

TFYA31

Valid from: 2017 Spring semester

Determined by
Board of Studies for Chemistry, Biology and Biotechnology

Date determined
2017-01-25

Main field of study
Engineering Biology, Applied Physics

Course level
Second cycle

Advancement level
A1X

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
Physics, Molecular Physics, Immunobiology, Cellbiology

Intended learning outcomes
The course describes materials build-up and properties, and presents the physics that is applied on novel phenomena due to material structure down to nanometer size. It also focuses on the connection between the nano world and biology. The student should after this course be able to:

- Describe material composition and build-up.
- Make simple materials calculations.
- Exemplify materials with definied properties.
- Identifiy proper materials in typical applikations.
- Review how nanoparticles and/or nanostructures are made and characterised.
- Evaluate material och nanoparticle risks.
- Interpret applications of nanobiomaterials.

Course content

- Introduction to materials for Engineering Biology.
- Polymers.
- Hard materials, composition and microstructure (metals, ceramics).
- Phase diagram and phase transformation (exemples from steel, aluminium alloys, micro electronics,...)
- Materials, electrical, physical and mechanical properties.
- Nanotechnology in soft and hard materials.
- Interaction between cells and biomaterials
- Preparation of nanostructures
- Nanobiomaterials and Bionanotechnology
- Nanotoxicology
- Ethics in Nanotechnology
- Student presentations about selected scientific articles.

Teaching and working methods

Lectures. Student presentations.
The course runs over the entire autumn semester.

Examination

UPG3	Student presentations	2 credits	U, G
TEN3	Written examination	4 credits	U, 3, 4, 5
TEN3/UPG3		0 credits	

For passed, the student will be examined on basics in material composition, material physical and electrical properties, materials preparatory- and analytical techniques, applications and risks of nanobiomaterials. Students presentations.

Grades

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

Other information

Supplementary courses: Biomedical material, Surface science, Microsystem and Nanobiology.

Department

Institutionen för fysik, kemi och biologi

Director of Studies or equivalent

Magnus Boman

Examiner

Magnus Odén

Education components

Preliminary scheduled hours: 38 h
Recommended self-study hours: 122 h

Course literature

Delar av olika läroböcker och föreläsning handouts. Tentamen kommer att ligga på det material som omfattas genom föreläsningar.

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.