Nanotechnology

Programme course

6 credits

Nanoteknologi

TFYA43

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
First cycle

Advancement level
G2X

Course offered for
- Physics and Nanoscience, Master's Programme
- Materials Science and Nanotechnology, Master's Programme
- Applied Physics and Electrical Engineering - International, M Sc in Engineering
- Applied Physics and Electrical Engineering, M Sc in Engineering
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- Engineering Biology, M Sc in Engineering
- Physics, Bachelor´s Programme
- Biomedical Engineering, Master's programme

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 knowledge in mechanics and wave physics

Intended learning outcomes
The course has a straightforward aim to acquaint students with the whole concept of nano-science and technology, which comprises the fabrication and understanding of matter at the ultimate scale at which nature designs in molecular size. The course will explore several hot topics with strong application aspects, but it will not deal so much with details of the complicated physics, biology, and mathematics.

Course content

The idea of this course is to introduce the world of nano-technology to the undergraduate students at an early stage before they have been specialized in different profiles. The course should give students a broad perspective and at the same time let them learn about some very recent developments of modern science and technology. Nano scale science and engineering has started and is expected to continue to produce strategic breakthroughs in technology. Nano-science has a strong multidisciplinary nature and it is developed at the intersection of traditional science and engineering, quantum mechanics, and most basic processes of life itself. Nano-technology encompasses how people harness the knowledge of nano-science to create materials, machines, and devices, which will fundamentally change the way that we live and work.
Lectures to cover the following topics:

1. Introduction of nano-technology;
2. Size matters;
3. Interlude I: the fundamental science behind nanotechnology;
4. Interlude II: the tools of nano-science (tools for measuring nano-structures and tools to fabricate nano-structures);
5. Optics and electronics;
6. Sensors;
7. Smart materials;
8. Bio-medical applications;
9. NEMS;
10. Perspectives and future outlook. Group meetings for the demonstration of some examples using nanotechnology and the student conference

Teaching and working methods

The course is composed of two parts: lectures and a student conference for topical presentations after their own literature searching.

Examination

KTR1	Optional written tests	0 credits	U, G
UPG1	Active Participation in the Student Conference	1 credits	U, G
TEN1	Written Examination	5 credits	U, 3, 4, 5

Written mini tests during the course may give bonus points at the final exam

Grades

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

Department

Institutionen för fysik, kemi och biologi

Director of Studies or equivalent
Magnus Johansson

Examiner
Jens Birch

Course website and other links
http://www.ifm.liu.se/undergrad/fysikgtu/coursepage.html?selection=all&sort=kk

Education components
Preliminary scheduled hours: 48 h
Recommended self-study hours: 112 h

Course literature

Additional literature

Books

M. Wilson et al, (2002) *Nanotechnology - basic science and emerging technologies*
(Chapman & Hall/CRC, 2002). Reference book

Websites

Lecture notes available online

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.