Principles of Physics and Introduction to Nanophysics

Programme course

10 credits

Fysikaliska principer och nanovetenskaplig introduktion

NFYA02

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
Physics

Course level
First cycle

Advancement level
G1X

Course offered for
- Physics and Nanoscience, Bachelor'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.

Intended learning outcomes
The course gives an introduction to physical theory and experiment. The theoretical part repeatedly demonstrates that wide areas of physics can be understood trough a clear understanding of a few basic concepts and principles. One purpose is to increase the interest for physics and to demonstrate the need for mathematical tools.
The same simple principles are also used to understand and explain properties of molecules and materials. Furthermore, an orientation about the research conducted at the department is given.
The experimental part stresses what is essential to make good physics; imagination to suggest possible hypothesis, experimental technique to test, ability to find a language (concepts) that gives a simple description. Strong emphasis is on the students ability to present their results in writing and to critically judge the validity of their own work.

Course content

The experimental work includes experimental problem solution where basic mechanical systems are studied.
An important goal is the ability to account for results in writing and to critically assess the validity of own work. The theory part includes both classical and modern physics. Within classical physics, mechanics, thermodynamics and statistical physics is treated. The thermodynamics pat is based on concepts such as micro- and macrostates. These fields are used to explain properties of materials and molecules. The modern physics topics are: A historical perspective on quantum physics, a philosophical perspective on quantum physics, Planck's description of the black body radiation and its connection to the green house effect, simple solutions to the Schrödinger equation illustrating energy quantisation, tunnelling, quantum mechanical operators, Bose-Einstein statistics illustrating the black body radiation. The explanatory power of modern physics is demonstrated and related to modern research

Teaching and working methods

The problem solving part consists of lectures and laboratory work. The theoretical part of the course consists of lectures and discussion sessions.
Guest lectures.
The course runs over the entire autumn semester.

Examination

UPG3	Written Assignment	0.5 credits	U, G
UPG2	Home Assignments	2.5 credits	U, G
LAB3	Laboratory Work	1.5 credits	U, G
LAB2	Laboratory Work	2.5 credits	U, G
TEN2	Written Examination	3 credits	U, 3, 4, 5

Guest lectures are mandatory.

Grades

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

Department

Institutionen för fysik, kemi och biologi

Director of Studies or equivalent

Magnus Johansson

Examiner

Marcus Ekholm

Course website and other links

http://cms.ifm.liu.se/edu/coursescms/NFYA02/

Education components

Preliminary scheduled hours: 75 h
Recommended self-study hours: 192 h

Course literature

Additional literature

Books

Nordling & Österman, *Physics Handbook* 8

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.