Physics

Programme course

5 credits

Fysik

TFYA86

Valid from: 2017 Spring semester

Determined by
Board of Studies for Computer Science
and Media Technology

Date determined
2017-01-25

Main field of study
Applied Physics, Physics

Course level
First cycle

Advancement level
G2X

Course offered for
- Computer Science and 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
Calculus, linear algebra, mechanics

Intended learning outcomes
In this course, the purpose for the student is to obtain a basic orientation in electromagnetism and its applications, including an introduction to quantum mechanical phenomena and optics. The course is adapted mainly for the D-programme. After finishing the course, the student will be able to:

- solve simpler problems in electromagnetism analytically: electrostatics, magnetostatics, induction and electromagnetic waves
- solve and visualize more complicated problems within electromagnetism with numerical methods using a computer program
- have a basic understanding for quantum mechanical phenomena, solving problems with diffraction in apertures and gratings

Course content

1. Electrostatics: Coulomb's law, electric field strength, potential, Gauss's law, capacitance, electric dipole, polarization, dielectric materials
2. Currents: current density, mobility, drift velocity, resistivity.
3. Magnetostatics: magnetic flux density, Biot-Savart's law, Ampere's law of circulation, magnetic dipole, magnetization, magnetic materials.
4. Quantum mechanics: from atoms to solid materials.

5. Electromagnetic fields varying with time: induction, electromotive force, Faraday's law, inductance, wave motion, refraction, interference and diffraction.
6. Examples of applications will be given during the course.

Teaching and working methods

Lectures, lessons and laboratory work

Examination

LAB3	Laboratory work	0.5 credits	U, G
KTR1	Optional examination	0 credits	U, 3, 4, 5
LAB2	Laboratory work	0.5 credits	U, G
TEN1	Written examination	4 credits	U, 3, 4, 5

The result obtained in KTR1 may add a bonus points to TEN1, up to one year after the result in KTR1 was obtained.

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 Jensen

Course website and other links

Education components

Preliminary scheduled hours: 50 h
Recommended self-study hours: 83 h

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.