



SH1011 Modern Physics 7.5 credits

Modern fysik

This is a translation of the Swedish, legally binding, course syllabus.

If the course is discontinued, students may request to be examined during the following two academic years

Establishment

Course syllabus for SH1011 valid from Autumn 2010

Grading scale

A, B, C, D, E, FX, F

Education cycle

First cycle

Main field of study

Technology

Language of instruction

The language of instruction is specified in the course offering information in the course catalogue.

Intended learning outcomes

After completing the course you should be able to

- Outline the scientific foundation for modern physics according the Course Main Content
- Perform quantum mechanical calculation for simple systems
- Apply quantum mechanical principles in science and technology
- Outline the most important experimental methods in modern physics

Course contents

Background for modern experimental physics. Relativity theory. De Broglie waves. Wave packets and the Heisenbergs uncertainty principle. Wave-particle-dualism. Internal structure of the atom and Bohr's model Elementary quantum physics. Foundations of quantum mechanics. The Schrödinger equation applied to simple potentials and boundary conditions. Interpretation of wave functions. Plane waves. Harmonical oscillators. Angular momentum and spin. The Hydrogen atom and the table of the elements. The Pauli principle. Planck's radiation law. X-rays and their spectra. Structure of the nuclei. Radioactive decay. The photoelectric effect, x-ray diffraction, electron diffraction and the Zeeman effect. Quantum physics applications to science and technology such as electron microscopy Stern-Gerlach's experiment, simple molecules and the solid state. Insulators, conductors and semiconductors. Applications of modern physics in medical imaging and radiation therapy.

Specific prerequisites

Basic calculus, algebra and mechanics.

Course literature

University Physics with Modern Physics by Hugh D. Young and Roger A. Freedman ISBN-10: 080532187X ISBN-13: 9780805321876

Examination

- LAB1 - Laboratory Work, 1.5 credits, grading scale: P, F
- TEN1 - Examination, 6.0 credits, grading scale: A, B, C, D, E, FX, F

Based on recommendation from KTH's coordinator for disabilities, the examiner will decide how to adapt an examination for students with documented disability.

The examiner may apply another examination format when re-examining individual students.

Ethical approach

- All members of a group are responsible for the group's work.
- In any assessment, every student shall honestly disclose any help received and sources used.

- In an oral assessment, every student shall be able to present and answer questions about the entire assignment and solution.