

FYSA21, Physics 2: Tools in Science, 30 credits
Fysik 2: Naturvetenskapliga tankeverktyg, 30 högskolepoäng
First Cycle / Grundnivå

Details of approval

The syllabus was approved by Study programmes board, Faculty of Science on 2007-03-01 to be valid from 2007-07-01, autumn semester 2007.

General Information

Language of instruction: English and Swedish

Main field of studies

Physics

Depth of study relative to the degree requirements

G2F, First cycle, has at least 60 credits in first-cycle course/s as entry requirements

Learning outcomes

The aim of the course is that students on completion of the course should have acquired the following knowledge and skills:

- To apply mathematical and numerical methods on scientific, above all physical, problem
- To use a high level language in scientific work.
- To present and interpret calculations for scientific systems in writing.
- To describe and use the basis to the quantum physics theoretical description in the form of quantum mechanics.

Course content

Based on applications in physics and other parts of the natural sciences mathematical and computational tools are introduced. Starting from specific problems, the universality of the methods is emphasized. Numerical tools, in the form of standard software, are introduced.

example of mathematical tools used are complex numbers, matrices, linear transformations, differential equations, functions of several variables, multiple

integrals, vector calculus and Fourier analysis.

Applications of the tools are carried out within different themes for example acoustics, signal and image processing, electromagnetism and quantum mechanics.

Within quantum mechanics, the experimental foundation of quantum physics is treated, the postulate of quantum mechanics, the Schrödinger equation for simple systems, measurable units, Eigenvalue problems, preserved units and commutators, harmonic oscillator, central field problems and angular momentum.

Course design

The teaching consists of lectures/laboratory sessions/seminars/group work/project work. Participation in laboratory sessions and project work and thereby integrated other teaching is compulsory.

Assessment

Examination is a written or oral exam on each part and computer-based projects throughout the course. Re-sit examinations are offered soon after the examination to students who do not pass.

Subcourses that are part of this course can be found in an appendix at the end of this document.

Grades

Marking scale: Fail, Pass, Pass with distinction.

To pass the entire course requires passed exam/passed laboratory reports/passed written assignments/passed project reports and participation in all compulsory parts.

Entry requirements

Admission to the course requires knowledge equivalent to FYSA11, Physics 1 General Physics, 30 credits and mathematics 30 credits.

Further information

The course may not be included in a higher education qualification together with FYSB01 Introduction to quantum mechanics, 7.5 credits and/or FYSB02 Quantum Mechanics and Computations, 15 credits.

Subcourses in FYSA21, Physics 2: Tools in Science

Applies from V15

- 0701 Theory - Written Exam, 10,0 hp
Grading scale: Fail, Pass, Pass with distinction
- 0705 Theory - Oral Exam, 0,0 hp
Grading scale: Fail, Pass
- 0706 Application, Quantum and Statistical Methods, 10,0 hp
Grading scale: Fail, Pass, Pass with distinction
- 0707 Assignments in Quantum Mechanics, 0,0 hp
Grading scale: Fail, Pass
- 0708 Project 1, 2,5 hp
Grading scale: Fail, Pass, Pass with distinction
- 0709 Project 2, 2,5 hp
Grading scale: Fail, Pass, Pass with distinction
- 0710 Project 3, 2,5 hp
Grading scale: Fail, Pass, Pass with distinction
- 0711 Project 4, 2,5 hp
Grading scale: Fail, Pass, Pass with distinction

Applies from H14

- 0701 Theory - Written Exam, 10,0 hp
Grading scale: Fail, Pass, Pass with distinction
- 0704 Projects and Experimental Workshops, 10,0 hp
Grading scale: Fail, Pass, Pass with distinction
- 0705 Theory - Oral Exam, 0,0 hp
Grading scale: Fail, Pass
- 0706 Application, Quantum and Statistical Methods, 10,0 hp
Grading scale: Fail, Pass, Pass with distinction
- 0707 Assignments in Quantum Mechanics, 0,0 hp
Grading scale: Fail, Pass