Faculty of Science

FYSC13, Physics: Solid State Physics, 7.5 credits

Fysik: Fasta tillståndets fysik, 7,5 högskolepoäng

First Cycle / Grundnivå

Details of approval

The syllabus was approved by Study programmes board, Faculty of Science on 2010-12-15 and was last revised on 2018-03-09. The revised syllabus applies from 2018-03-09, spring semester 2018.

General Information

The course is a compulsory first cycle course for students intending to execute a Bachelor of Science degree project in physics.

Language of instruction: English

Main field of studies	*Depth of study relative to the degree requirements*
Physics	G2F, First cycle, has at least 60 credits in first-cycle course/s as entry requirements

Learning outcomes

The objective is that the students, on completion of the course, shall have acquired the following knowledge and skills:

Knowledge and understanding

On completion of the course, the students shall be able to

- explain fundamental concepts and identify key areas within solid state physics such as crystal structure, lattice vibrations, band structure and the free electron model, conductors, semiconductors and isolators
- exemplify and qualitatively describe current research within a delimited area of solid state physics

Competence and skills

On completion of the course, the students shall be able to

- solve simple calculation assignments related to the physical models presented in the course
- use computer simulations to analyse and visualise basic properties of physical models
- perform and report and analyse in writing laboratory experiments within key areas of solid state physics
- individually or in small groups obtain knowledge within an area of solid state physics and report it in speech and writing

Judgement and approach

On completion of the course, the students shall be able to

- make a general assessment of the applicability and limitations of the physical models in relation to real systems within solid state physics
- reflect on, discuss and interrogate an application of modern solid state physics and its potential effects within a certain sector of society

Course content

The course deals with the following components:

- crystal structures
- diffraction and reciprocal lattice
- crystal binding
- phonons: lattice vibrations and thermal properties
- free electron gas
- electronic band structure
- semiconductors
- fermi surfaces and metals
- superconductivity
- magnetism
- ferroelectricity
- surface structures, and
- nanostructures

The course is one of four modules in Physics 3 in the second year of the Bachelor of Science programme in physics.

Course design

The teaching consists of lectures, project work, laboratory experiments, and computer and calculation exercises. Compulsory participation is required in laboratory exercises, project work and associated elements.

Assessment

The assessment is based on written or oral exam at the end of the course, and written lab reports. Students who fail an assessment will be offered another opportunity for assessment soon thereafter.

The examiner, in consultation with Disability Support Services, may deviate from the regular form of examination in order to provide a permanently disabled student with a form of examination equivalent to that of a student without a disability.

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.
For a grade of Pass on the whole course, the students must have passed the exam, the laboratory reports, the assignments, the project report and project presentation, and participated in all compulsory components.

The final grade is determined by the aggregated results of the oral exam and the laboratory sessions in accordance with the number of points for the different components.

Entry requirements

To be admitted to the course, students must have knowledge equivalent to 67.5 credits in physics, including FYSA21 Tools in Science, 30 credits, and FYSC11 Atomic and Molecular Physics, 7.5 credits, or the equivalent.

Further information

The course may not be included in a degree together with FYSA31 Physics 3: Modern Physics, 30 credits.

Subcourses in FYSC13, Physics: Solid State Physics

Applies from V11

1001 Oral Exam, 5,0 hp
Grading scale: Fail, Pass, Pass with distinction
1002 Laboratory Exercises and Projects, 2,5 hp
Grading scale: Fail, Pass, Pass with distinction