



Faculty of Health, Science and Technology
Physics

Syllabus

Solid State Physics

Course Code:	FYGC09
Course Title:	Solid State Physics <i>Fasta tillståndets fysik</i>
Credits:	7.5
Degree Level:	Undergraduate level
Progressive Specialisation:	First cycle, has at least 60 credits in first-cycle course/s as entry requirements (G2F)

Major Field of Study:

FYA (Physics)

TKA (Engineering Physics)

Course Approval

The syllabus was approved by the Faculty of Health, Science and Technology 2015-02-18, and is valid from the Autumn semester 2015 at Karlstad University.

Prerequisites

Physics courses 45 ECTS cr., including Materia 7.5 ECTS cr (alternatively introduction to modern physics 7.5 ECTS cr), and Quantum Physics I, 7.5 ECTS cr. and mathematics 30 ECTS cr., including the courses Linear Algebra 7.5 ECTS cr and Multivariable Analysis 7.5 ECTS cr., or equivalent.

Learning Outcomes

Upon completion of the course, students should be able to:

- explain and describe the structure of crystals, reciprocal space, and atomic bonds,
- give an account of and perform calculations on diffraction and its link to reciprocal space,
- explain and give an account of dynamics of crystals, phonons and thermal properties,
- give an account of and perform calculations on the electron structure of crystals, electric conductivity, dielectric function and plasmons,
- describe and explain different magnetic properties and their origins.

Content

The structure of crystals: different crystal types, direct and reciprocal lattice, experimental determination of crystal structures, diffraction of crystals, bindings in crystals, cohesive energy.

The dynamics of crystals: lattice vibrations, vibrational modes, and thermal properties.

The electronic structure of crystals: free electron gas, nearly-free electron model, energy band and effective band mass.

Metals, semi-conductors and insulator band-structure, fermi surfaces, shielding, plasmons.

Superconductivity, dielectric and magnetic properties.

Practical laboratory sessions on relevant phenomena.

Reading List

See separate document.

Examination

Assessment is based on written and oral exams, hand-in assignments and laboratory reports.

Grades

One of the grades Fail (U), Pass (G), or Distinction (VG) is awarded in the examination of the course. Engineering programme students are awarded a grade on the scale U (Fail), 3 (Pass), 4 (Pass with Some Distinction) or 5 (Pass with Distinction).

Quality Assurance

Follow-up relating to learning conditions and goal-fulfilment takes place both during and upon completion of the course in order to ensure continuous improvement. Course evaluation is partly based on student views and experiences obtained in accordance with current regulations and partly on other data and documentation. Students will be informed of the result of the evaluation and of any measures to be taken.

Course Certificate

A course certificate will be provided upon request.

Additional information

The local regulations for studies at the Bachelor's and Master's levels at Karlstad University stipulate the obligations and rights of students and staff.