Course syllabus

Faculty of Technology

Department of Physics and Electrical Engineering

1FY805 Fasta tillståndets fysik I med partikelfysik, 7.5 credits
Solid State Physics I with Particle Physics

Main field of study
Physics

Subject Group
Physics

Level of classification
First Level

Progression
G1F

Date of Ratification
Approved 2009-12-01
Revised 2014-06-16 by Faculty of Technology. Revision made for objectives and content.
The course syllabus is valid from autumn semester 2014

Prerequisites
Mechanics 7.5 credits (1FY804), Physics – Electricity and Magnetism 7.5 credits (1FY802), Atomic and Nuclear Physics 7.5 credits (1FY801), and Waves and Optics 7.5 credits (1FY803) or equivalent.

Objectives
After completion of the course, the student should have:

- insight in the structure of crystals and in connections between structure and mechanical properties
- an understanding of the quantum statistics of the electron gas and of the phonon gas
- insight in the connections between band structure and electrical, thermal, and optical properties
- insight in the applicability of models in different materials
- insight in physical limitations in nanotechnology

Content
The course covers the following subjects:

- Solid state physics: crystal structure, x-ray diffraction, modules of elasticity, conductivity, heat capacity, energy bands, semiconductors, optical properties, p-n junctions, magnetism, Moore's law
- statistical physics: quantum effects, fermions, bosons, distribution functions - BE, FD, Boltzmann gas, equipartition, electron gas, phonon gas
- course lab experiments where measured results with error bars are compared with tabulated materials properties and equations derived for ideal systems

Type of Instruction
Lectures, group assignments and course labs. The laboratory experiments are obligatory.

Examination
The course is assessed with the grades Fail (U), Pass (G) or Pass with Distinction (VG).

On request, students may have their credits translated to ECTS-marks. Such a request must be sent to the examiner before the grading process starts.

The student’s knowledge is assessed in the form of oral and/or written examinations. Assessment of laboratory assignments and continuous assessment of experimental skills. Students who do not pass the regular examination are given the opportunity to do a reset examination shortly after the regular examination.

Course Evaluation
A course evaluation will be carried out at the end of the course in accordance with the guidelines of the University. The result of the course evaluation will be filed at the department.

Other
After completed training students will receive a degree certificate from the Examination Department upon request.

Students who receive a passing grade in the course may download a course certificate through the Student Portal. Otherwise they may request a course certificate from the school secretary.

Required Reading and Additional Study Material
Required reading
Richard J. Turton, *The Physics of Solids*, Oxford University Press (2000). Pages 432.