

SYLLABUS

Quantum Mechanics and Solid State Physics 7.5 credits F0019T

Fasta tillståndets fysik med kvantmekanik

Course syllabus admitted: Autumn 2014 Sp 1 - Spring 2016 Sp 4

**DECISION DATE
2014-02-14**

Quantum Mechanics and Solid State Physics 7.5 credits F0019T

Fasta tillståndets fysik med kvantmekanik

First cycle, F0019T

Education level	Grade scale	Subject	Subject group (SCB)
First cycle	G U 3 4 5	Fysik	Physics

Entry requirements

In order to meet the general entry requirements for first cycle studies you must have successfully completed upper secondary education and documented skills in English language and F0004T Physics 1, F0005T Physics 2, and F0006T Physics 3 or equivalent

Selection

The selection is based on 1-165 credits.

Examiner

Hans Weber

Course Aim

To impart basic knowledge of crystal structures of solids, and their mechanical, thermal, electrical and optical properties.

Contents

The Schrödinger equation. Particle in a box. The harmonic oscillator. Crystal structures and interatomic forces. Scattering theory and descriptions of various experimental techniques employed in structure analysis. Heat capacity on the basis of the models of Einstein and Debye. The quantization of the energy of elastic waves in terms of phonons. Lattice waves and the Brillouin zone. Thermal conductivity. The success and failure of the free electron model in accounting for observed metallic properties. The Hall effect and cyclotron resonance. The electronic contribution to heat capacity and thermal conductivity. Energy bands in solids. The nearly free electron model and band gaps. Semiconductor theory.

Realization

Each course occasion's language and form is stated and appear on the course page on Luleå University of Technology's website.

The education consists of lessons and solution of problems.

Examination

If there is a decision on special educational support, in accordance with the Guideline Student's rights and obligations at Luleå University of Technology, an adapted or alternative form of examination can be provided. Written examination at the end of the course. There can be alternative examination methods.

Remarks

This course cannot be part of the degree together with the courses MTF106, MTF064, or MTF005.

If required lectures can be given in English.

Overlap

The course F0019T is equal to MTF132, F0053T

Literature. Valid from Autumn 2007 Sp 1

Kittel, C: Introduction to Solid State Physics, Wiley, 2005. 8:th edition, ISBN 0-471-41526-x.

Lehto N, Marklund S och Weber H.: Solid State Physics, Problems and Solutions, LTU.

FYSIKALIA, tabell- och formelsamling.

Course offered by

Department of Engineering Sciences and Mathematics

Items/credits

Number	Type	Credits	Grade
0001	Written exam	7.5	G U 3 4 5

Last revised

by Mats Näsström 2014-02-14

Syllabus established

The syllabus was established by the Department of Applied Physics and Mechanical Engineering 2007-02-28, and remains valid from autumn 2007.