

# Physics of Condensed Matter part I

Programme course

6 credits

Materiefysik del 1

TFFY70

Valid from: 2017 Spring semester

**Determined by**

Board of Studies for Electrical  
Engineering, Physics and Mathematics

**Date determined**

2017-01-25

## Main field of study

Applied Physics, Physics

## Course level

Second cycle

## Advancement level

A1X

## Course offered for

- Physics and Nanoscience, Master's Programme
- Materials Science and Nanotechnology, Master's Programme
- Physics and Nanotechnology
- Biomedical Engineering, M Sc in Engineering
- Applied Physics and Electrical Engineering - International, M Sc in Engineering
- Applied Physics and Electrical Engineering, M Sc in Engineering

## Entry requirements

Note: Admission requirements for non-programme students usually also include admission requirements for the programme and threshold requirements for progression within the programme, or corresponding.

## Prerequisites

Modern physics, Thermodynamics and statistical mechanics and Quantum Mechanics desirable but not required.

## Intended learning outcomes

The overall goal with the course is that the student shall be able to define, derive and utilize/apply relations on problems within condensed matter physics. This means that the student shall:

- know about crystal structures for solids and how to determine the structure from diffraction experiments.
- know about the electronic structure of ordered solids, i.e. the origin of the electronic band structure.
- know and understand static and dynamic properties of solids.
- be able to formulate idealized models for problems within condensed matter physics.
- be able to apply knowledge and skills to solve problems within condensed matter physics.
- be able to explain in a well structured and logical concise way relations/derivations within condensed matter physics as well as between central concepts of the theory.

## Course content

The atomic structure of ordered solids. Theoretical and experimental background for structure determinations using diffraction. Lattice vibrations and from these derived dynamic properties, such as heat capacity and conduction. The electronic structure of ordered solids, including some theoretical models for describing the electron band structure of different types of solids; the free electron model, the nearly free electron model and the tight binding model. Electron states in semiconductors, doping. Fermi surfaces in metals. Defects.

## Teaching and working methods

The course material is presented in the form of lectures, problem solving sessions and laboratory excersises.

## Examination

TEN1	Written Examination	5 credits	U, 3, 4, 5
LAB1	Laboratory Work	1 credits	U, G

## Grades

Four-grade scale, LiU, U, 3, 4, 5

## Department

Institutionen för fysik, kemi och biologi

## Director of Studies or equivalent

Magnus Johansson

## Examiner

Ivan Ivanov

## Course website and other links

<http://www.ifm.liu.se/undergrad/fysikgtu/coursepage.html?selection=all&sort=kk>

## Education components

Preliminary scheduled hours: 54 h

Recommended self-study hours: 106 h

## Course literature

Kittel, C.: "Introduction to Solid State Physics", 8th ed., John Wiley, 2005.

## Common rules

Regulations (apply to LiU in its entirety)

The university is a government agency whose operations are regulated by legislation and ordinances, which include the Higher Education Act and the Higher Education Ordinance. In addition to legislation and ordinances, operations are subject to several policy documents. The Linköping University rule book collects currently valid decisions of a regulatory nature taken by the university board, the vice-chancellor and faculty/department boards.

LiU's rule book for education at first-cycle and second-cycle levels is available at [http://stydokument.liu.se/Regelsamling/Innehall/Utbildning\\_pa\\_grund-\\_och\\_avancerad\\_niva](http://stydokument.liu.se/Regelsamling/Innehall/Utbildning_pa_grund-_och_avancerad_niva).