

# Physics of Condensed Matter part II

Programme course

6 credits

Materiefysik del 2

TFYA25

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

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

Quantum mechanics, Physics of Condensed Matter

## Intended learning outcomes

This course provides an in-depth knowledge in key areas of solid state physics (optical properties, superconductivity, magnetism, dielectrics, surface phenomena). After completing the course students will be able to:

- Describe the interaction between electromagnetic radiation and solid materials and the interaction between electrons and solid materials. Derive and describe models.
- Describe superconductivity and the theory of this phenomenon.
- Describe magnetism (diamagnetism, paramagnetism, ferromagnetism) and

- describe/derive models that lead to the magnetic susceptibility
- Describe and treat the atomic structure of surfaces from various perspectives (real space, reciprocal space, diffraction)
  - Apply the basic theories in the different areas to solve problems

## Course content

A theoretical treatment of magnetism in condensed matter and a description of applications of magnetism. An extended description of the mechanisms giving the optical properties of condensed matter. A combined phenomenological and theoretical treatment of superconductivity. A treatment of surfaces .

## Teaching and working methods

The course is given in form of lectures which include periods för solving problems. Parts of the course are treated in oral presentations by the students, in smaller groups.

## Examination

TEN2	Written examination	U, 3, 4, 5	4.5 credits
MUN1	Oral presentations	U, G	1.5 credits

## Grades

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

## Department

Institutionen för fysik, kemi och biologi

## Director of Studies or equivalent

Magnus Johansson

## Examiner

Roger Uhrberg

## Course website and other links

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

## Education components

Preliminary scheduled hours: 48 h

Recommended self-study hours: 112 h

## Course literature

Kittel, C.: "Introduction to Solid State Physics" , 8h 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://styrdokument.liu.se/Regelsamling/Innehall/Utbildning\\_pa\\_grund-\\_och\\_avancerad\\_niva](http://styrdokument.liu.se/Regelsamling/Innehall/Utbildning_pa_grund-_och_avancerad_niva).