



MH1036 Materials Physics 7.5 credits

Materialfysik

This is a translation of the Swedish, legally binding, course syllabus.

Establishment

The official course syllabus is valid from the spring semester 2025 in accordance with the decision by the Head of the ITM School: M-2023-2085. Date of decision: 2023-10-12.

Grading scale

A, B, C, D, E, FX, F

Education cycle

First cycle

Main field of study

Technology

Specific prerequisites

For CMATD, at least 45 higher education credits in the Technology main field of study from programme syllabus for year 1-3.

Language of instruction

The language of instruction is specified in the course offering information in the course catalogue.

Intended learning outcomes

After passing the course, the student should be able to:

1. Explain basic physical concepts in crystal structures, electronic structures, lattice vibrations and magnetism.
2. Analyse and solve problems where the procedure at atom level is to prefer the macroscopic (or technical) procedure.
For higher grades, the student should furthermore be able to:
3. Describe, explain and predict properties of solid materials from atom level.

Course contents

The course deals with:

- Classical theory of metals
- Crystal lattices, crystal symmetries, Bravais lattices
- The reciprocal lattice
- Electrons in periodic potentials
- Band structure (ab initio) methods, band structure of selected metals
- Cohesive properties
- Harmonic crystals, elasticity, sound velocities
- Anharmonic powers
- Phonons in metals, phonon models
- Semiconductors
- Magnetism, diamagnetism, paramagnetism
- Magnetic order, Stoner model, Landau theory

Examination

- TEN1 - Written exam, 6.0 credits, grading scale: A, B, C, D, E, FX, F
- INL1 - Homework, 1.5 credits, grading scale: P, F

Based on recommendation from KTH's coordinator for disabilities, the examiner will decide how to adapt an examination for students with documented disability.

The examiner may apply another examination format when re-examining individual students.

If the course is discontinued, students may request to be examined during the following two academic years.

Ethical approach

- All members of a group are responsible for the group's work.
- In any assessment, every student shall honestly disclose any help received and sources used.
- In an oral assessment, every student shall be able to present and answer questions about the entire assignment and solution.