# Solid State Physics, Part I, 7.5 credits

Fasta tillståndets fysik, del 1, 7.5 hp

Third-cycle education course

6FIFM63

Department of Physics, Chemistry and Biology

Valid from: First half-year 2024

**Approved by** **Approved**

**Registration number**

## Entry requirements

Entry requirement for studies on third-cycle education courses

- second-cycle degree,
- 240 credits in required courses, including at least 60 second-cycle credits, or
- acquisition of equivalent knowledge in some other manner

Specific entry requirements for this course
Prerequisites: Quantum Mechanics and Electrodynamics

## Learning outcomes

By the end of the course the students will be able to:
• Acquire knowledge about the Drude and Sommerfeld models of metals.
• Gain an understanding of crystal and reciprocal lattices.
• Learn the basics of X-ray diffraction.
• Understand the behavior of electrons in a periodic potential.
• Familiarize with the semiclassical model of electron dynamics.
• Apply the Drude and Sommerfeld models to describe the electronic properties of metals.
• Analyze and interpret crystal structures using reciprocal lattices.
• Utilize X-ray diffraction techniques to study crystal structures.
• Solve problems involving electrons in a periodic potential.
• Apply the semiclassical model to analyze electron dynamics in solids.
• Summarize, represent, and discuss key concepts and methods in solid state physics.
• Critically evaluate different models and approaches in solid state physics.
• Integrate knowledge from quantum mechanics and electrodynamics to solve complex problems in solid state physics.

## Contents

Main focus will be on Drude and Sommerfeld models of metals, crystal and reciprocal lattices, introduction to X-ray diffraction, electrons in a periodic potential, and semiclassical model of electron dynamics

## Educational methods

Lectures

## Examination

To get 7.5 points you will need to pass an oral exam, which tests the knowledge of all the material.
You can participate in person, on Zoom, or even in a self-study mode (self-reading of the textbook + lecture notes), if you manage to pass the exam.

## Grading

Two-grade scale

## Course literature

"Solid State Physics" by N.W. Ashcroft and N.D. Mermin (ISBN 0-03-083993-9) (chapters 1-20), lecture notes

## General information

The course is planned and carried out according to what is stated in this syllabus. Course evaluation, analysis and suggestions for improvement should be fed back to the Research and PhD studies Committee (FUN) by the course coordinator.