

Solid State Physics II, 7.5 credits

Fasta tillståndets fysik II, 7.5 hp

Third-cycle education course

6FIFM49

Department of Physics, Chemistry and Biology

Valid from: Second 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, Statistical Physics

Specific information

The course is a continuation of the Solid State Physics course (Part I), however, you can attend even if you did not take Part I.

Learning outcomes

By the end of the course the students will be able to:

- Gain an understanding of atomic vibrations in crystals, including phonons and anharmonism.
- Learn about crystal defects and their effects on material properties.
- Acquire knowledge of the fundamentals of magnetism.
- Understand the basic principles of superconductivity.
- Analyze and describe atomic vibrations in crystals using the concepts of phonons and anharmonism.
- Evaluate the impact of defects on the physical properties of crystals.
- Apply principles of magnetism to explain magnetic properties of materials.
- Solve problems related to superconductivity and its applications.
- Summarize, represent, and discuss key concepts and methods in solid state physics, with a focus on atomic vibrations, defects, magnetism, and superconductivity.
- Critically assess different models and theories related to the course topics.
- Integrate knowledge from quantum mechanics and statistical physics to solve complex problems in solid state physics.

Contents

The main focus will be on the description of atomic vibrations in crystals (phonons and anharmonism), defects, introduction to magnetism, and superconductivity

Educational methods

Lectures

Examination

To earn 7.5 points, you will need to pass a written exam based on problem solving. You can participate in person, on Zoom, or even in a self-study mode (self-reading of the textbook + lecture notes), provided you solve the problems. Please send me an email if you are going to participate online to receive the Zoom link and/or if you want to receive the lecture notes. You will receive the problems that you need to solve to pass the course during the lectures or via email if you miss the lectures.

Grading

Two-grade scale

Course literature

Solid State Physics" by N.W. Ashcroft and N.D. Mermin. (Chapters 21, 22, 23, 25, 30, 31, and 34 + 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.