



# SK2771 Solid State Physics 5.0 credits

## Fasta tillståndets fysik

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

## Establishment

The headmaster at the SCI school has 2021-03-16 decided to establish this syllabus to apply from Autumn 2021, registration number: S-2021-0167

## Grading scale

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

## Education cycle

Second cycle

## Main field of study

Engineering Physics

## Specific prerequisites

Courses of the technology science block or equivalent; familiarity with basic quantum mechanics. In addition, for master-program students - basic requirements as specified for admission.

## Language of instruction

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

## Intended learning outcomes

After completing the course the student should be able to

- describe the structure and physical properties of crystalline solids
- formulate and apply the theory of crystalline solids
- calculate the structure, electronic, optical and thermal properties of technologically important crystalline materials

## Course contents

Crystalline solids consist of a very large number of interacting entities and their physical properties, and these can be atoms, ions, electrons, spin etc. Studying this is essential to understand the properties of solids and thereby select and design materials for specific applications. The specific topics that will be covered are:

- crystal structure, reciprocal lattice
- diffraction of waves by crystals
- crystal binding
- phonons -crystal vibrations, phonons -thermal properties
- free electron model of metals, energy bands, semiconductors and Fermi-surfaces

The course will emphasize the  $k$ -space formalism and its application to understand diffraction of waves (e.g., X-rays, electrons) by crystals, the properties of phonons (cf. lattice vibrations), electronic band-structure and in the broader context of waves (e.g., electromagnetic waves and sound waves) in periodic media

## Examination

- **TEN1** - Written examination, 5.0 credits, grading scale: A, B, C, D, E, FX, 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.

## Other requirements for final grade

Grade A-E on the written exam, 5.0 hp

## **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.