# KD2155 Solid State Chemistry: Structures and Methods 7.5 credits

**Fasta tillståndets kemi: struktur och metoder**

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

## Establishment

Course syllabus for KD2155 valid from Spring 2019

## Grading scale

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

## Education cycle

Second cycle

## Main field of study

Chemical Science and Engineering

## Specific prerequisites

Admission requirements for programme students at KTH:
At least 150 credits from grades 1, 2 and 3 of which at least 110 credits from years 1 and 2, and bachelor's work must be completed, within a programme that includes:
75 university credits (hp) in chemistry or chemical engineering, 20 university credits (hp) in mathematics and 6 university credits (hp) in computer science or corresponding

Admission requirements for independent students:
75 university credits (hp) in chemistry or chemical engineering, 20 university credits (hp) in mathematics and 6 university credits (hp) in computer science or corresponding. Documented proficiency in English corresponding to English B.

## Language of instruction

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

## Intended learning outcomes

After having passed the course, the student should be able to:

● describe the relationship between structure and chemical bonding, and draw conclusions about the physical properties of materials such as macroscopic magnetic, electrical and optical behavior

● describe how semiconductors are made, which structures they have, describe the operation of simple semiconductor devices and analyse the consequences of doping

● describe the basic principles of interactions of X-rays with materials and describe how those principles can be exploited in different methods to obtain structural information

● describe the basic principles of Solid-state NMR and electron microscopy

● identify and analyse the choice of studied structural methods most suitable for selected materials and explain how basic principles define performance such as sensitivity and resolution

● describe and exercise selected methods of solid state synthesis

## Course contents

● The crystalline state and desciption of crystal structures

● Determination of solid structures, practical use of databases

● Bands and bonding structure of solids

● Physical properties of various solids

● Production and characterization of some nanomaterials

● Basic principles of X-ray diffraction

● Basic principles of electron microscopy

● Basic principles of solid state NMR spectroscopy

## Course literature

R. Tilley, Understanding Solids: The Science of Materials, 2e, Wiley 2013

Distributed course material

## Examination

- TEN1 - Written Exam, 5.0 credits, grading scale: A, B, C, D, E, FX, F
- LAB1 - Laboratory Work, 2.5 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.

## Other requirements for final grade

Completed and passed all course components

## 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.