



MH1034 Metallic Materials 7.5 credits

Metalliska material

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-2023-2081. 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. Identify and illustrate the structure of metals with regard to atomic and micro-structure and explain effect of various atomic defects.
2. Explain and describe deformation, and hardening mechanisms of metals and secondary structure formation (recrystallisation/grain growth) and its effect on the mechanical properties of metals.
3. Use phase diagrams and isothermal transformation diagrams to interpret diffusion controlled as well as non-diffusion controlled structure formation in metallic materials including the concept of segregation.
4. Relate properties and production processes of the most common design metals and the fundamental structure and properties of composites.
5. Describe fracture mechanisms and common corrosion and decomposition mechanisms of metals.
6. Carry out a project work in metallic materials that are presented in a technical report and via a scientific presentation.

Course contents

The course is intended to give an introduction to the fundamental structure, properties and applications of metals. The course deals with:

- Atomic structure of metallic materials
- Relations between structure and properties
- Dislocations and other lattice defects
- Mechanical properties, elastic and plastic deformation
- Binary phase diagrams and solidification structures of these
- Hardening mechanisms
- Solid phase transformations including the concept of diffusion and diffusionless phase transformations
- Solidification and segregation
- Construction metals and production processes
- The fundamental structure of composites
- Fracture and time-dependent deformation
- Corrosion and time-dependent degradation of metals
- Handling of light optical microscopy (LOM)

Examination

- TEN1 - Written exam, 4.0 credits, grading scale: A, B, C, D, E, FX, F
- LAB1 - Laboratory assignments, 2.5 credits, grading scale: P, F
- PRO1 - Project, 1.0 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.