MH1024 Fundamentals of Materials Science- Metallic Materials 6.0 credits

Materiallära metalliska material

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

Establishment

Course syllabus for MH1024 valid from Spring 2013

Grading scale

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

Education cycle

First cycle

Main field of study

Technology

Specific prerequisites

The KTH courses below on Material Design and Engineering, or similar

- Perspectives on Materials Design
- Materials Chemistry
- Solid Mechanics, Basic Course

Language of instruction

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

Intended learning outcomes

The course covers metallic materials. Apart from the specific aims given below the course gives an overview of metallic materials and their applications.

After the course the student should be able to:

- sketch the most common crystal structures and give crystallographic orientations and planes in crystals using vectors and Millers indices.
- describe and interpret phase transformations (diffusion controlled as well as diffusionless) and couple these to mechanical properties.
- interpret microstructures and relate them to phase transformations.
- explain/describe/recognize deformation- and strengthening mechanisms specifying the underlying cause (type of defects, microstructure etc).
- describe the most common corrosion and decomposition mechanisms for metallic materials.
- use binary and ternary phase diagrams.
- perform simple calculations and estimations within all areas mentioned above
- basic terminology in Swedish and English

Course contents

The atomic and molecular structure of metals. Microstructure. Relationship between structure and properties. Dislocations and other lattice defects. Plastic deformation. Time dependent deformation. Fracture. Phase diagrams. Phase transformations. Solidification. Phase transformations in solid state. Diffusionless phase transformations. Structural transformations. Hardening mechanisms. Steel and other alloys.

Disposition

Lectures followed by experimental laboratory work within the same field

Course literature

Materials Science and Engineering, William D Callister and David G. Rethwisch

Kompendium i Materiallära (MAD)

Examination

- TEN1 - Written examination, 4.0 credits, grading scale: A, B, C, D, E, FX, F
- LAB1 - Laboratory Work, 2.0 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.

After each laboratory, there is a test. Passed test+presence in all labs are requirements for passing the Lab moment.

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.