



Faculty of Technology and Science  
Mechanical and Materials Engineering

### Syllabus

#### Course Approval

The syllabus was approved by the Faculty Board of Technology and Science on 18 December 2013, and is valid from the Autumn semester of 2014 at Karlstad University.

**Course Code:** MTAD10

**Materials in Industrial Applications, 7.5 ECTS Credits**

**(Material i industriella tillämpningar, 7.5 Swedish credit points)**

**Degree Level:** Master

**Progressive Specialisation:** A1N (Second cycle, has only first-cycle course/s as entry requirements)

#### Language of Instruction

Swedish or English

#### Prerequisites

Thermodynamics and energy technology 7,5 ECTS, Solid Mechanics 7,5 ECTS and Materials Engineering 7,5 ECTS or the equivalent.

#### Major Field of Study

MTA (Mechanical Engineering)

#### Learning Outcomes

In this course, students should develop and broaden their knowledge obtained in basic courses in materials engineering. The focus of the course is on materials properties required for industrial applications and it covers main types of engineering materials such as steels, cast irons, light alloys, high-temperature materials, copper-based alloys and metal and ceramic based composites. The main attention is paid on understanding of the relation between microstructure, treatment, properties and potential applications of the mentioned materials.

Upon completion of the course, for each studied group of materials, students should be able to

- give an account of the main classes of engineering materials, describe standard classifications, main properties and the most important areas of applications,
- give an account of methods to achieve the specific properties required for a certain application through alloying, heat treatment, cold working and hot working,
- describe and explain how changes in microstructure can impact on the properties of each type of material,
- identify the basic requirements for a given application and specify the type of material that would meet the requirements and explain why,
- explain the advantages and disadvantages of each materials type in relation to a given application,
- search, evaluate and compile information on materials.

#### Content and Form of Instruction

The course deals with microstructure, heat treatments, properties, areas of application and classification for main types of engineering materials; steels, cast irons, high-temperature materials, light alloys, copper-based alloys and metal and ceramic based composites. Instruction is in the form of lectures and a group assignment. In

lectures, theoretical background with useful examples of materials applications is given. To get practical experience in the search and analysis of information about engineering materials, students conduct a group assignment, called compendium, which is presented in the form of a written report. The compendium contains written answers on a number of questions for each group of materials and students should find the answers in the course book, recommended literature and open Internet resources. The compendium is then the basis for the oral exam.

#### Reading List

See separate document.

#### Examination

Examination is organized in the form of an oral exam.

#### Grades

One of the grades 5 (Distinction), 4 (Some Distinction), 3 Pass , or Fail (U), is awarded in the examination of the course.

#### Quality Assurance

Follow-up relating to learning conditions and goal-fulfilment takes place both during and upon completion of the course in order to ensure continuous improvement. Course assessment is based on student views and experiences as reported in written course evaluations and/or group discussions. Students will be informed of the result of the evaluation and of the measures to be taken.

#### Course Certificate

A course certificate will be provided upon request.

#### Additional Information

Students who enrolled before 1 July 2007 will complete their studies in accordance with the requirements of the earlier admission. Upon completion students may request degree and course certificates to be issued under the current ordinance if they meet its requirements.

The local regulations for studies at the Bachelor's and Master's levels at Karlstad University stipulate the obligations and rights of students and staff.

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