Faculty of Health, Science and Technology
Materials Engineering

# Syllabus

## Materials in Industrial Applications

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| **Course Code:** | MTAD10 |
| **Course Title:** | Materials in Industrial Applications<br>*Material i industriella tillämpningar* |
| **Credits:** | 7.5 |
| **Degree Level:** | Master's level |
| **Progressive Specialisation:** | Second cycle, has only first-cycle course/s as entry requirements (A1N) |

**Major Field of Study:**
MTA (Mechanical Engineering)

**Course Approval**
The syllabus was approved by the Faculty of Health, Science and Technology 2017-02-14, and is valid from the Autumn semester 2017 at Karlstad University.

**Prerequisites**
Thermodynamics and Energy Egineering 7.5 ECTS, Solid Mechanics 7.5 ECTS and Materials Engineering 7.5 ECTS, or equivalent, and upper secondary level English 6 or B, or equivalent.

**Learning Outcomes**
The aim of the course is that 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 the types of engineering materials such as steels, cast irons, light alloys, high-temperature materials, copper-based alloys and metal and ceramic based composites. The focus is on understanding the relation between treatment, microstructure, 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 sub 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**
The course deals with microstructure, heat treatments, properties, areas of application and classification for the 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, seminars and a group assignment. The lectures provide theoretical background with useful examples of materials application. To get practical experience in the search and analysis of information about engineering materials, students compile a compendium as a group project, 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 text book, recommended literature and open Internet resources. The compendium is then the basis for the exam.

**Reading List**
See separate document.

**Examination**
Assessment is based on a written exam and a written report on the compendium.

**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 evaluation is partly based on student views and experiences obtained in accordance with current regulations and partly on other data and documentation. Students will be informed of the result of the evaluation and of any measures to be taken.

**Course Certificate**
A course certificate will be provided upon request.

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