



Faculty of Health, Science and Technology
Materials Engineering

Syllabus

Materials in Industrial Applications

Course Code:	MTAD10
Course Title:	Materials in Industrial Applications <i>Material i industriella tillämpningar</i>
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 2022-08-30, and is valid from the Spring semester 2023 at Karlstad University.

Prerequisites

Registered for Thermodynamics, 7.5 ECTS credits, Materials Engineering, 7.5 ECTS credits, and Solid Mechanics, 7.5 ECTS, plus upper secondary level English 6, or equivalent

Learning Outcomes

The aim of the course is for students to develop and broaden their knowledge obtained in basic courses in materials engineering.

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 textbook, recommended literature, and open Internet resources. The compendium is then the basis for the exam.

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.

Reading List

See separate document.

Examination

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

If students have a decision from Karlstad University entitling them to Targeted Study Support due to a documented disability, the examiner has the right to give such students an adapted examination or to examine them in a different manner.

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.