



Faculty of Health, Science and Technology
Materials Engineering

Syllabus

Materials Engineering, basic course

Course Code:	MTGA13
Course Title:	Materials Engineering, basic course <i>Materialteknik grundkurs</i>
Credits:	7.5
Degree Level:	Undergraduate level
Progressive Specialisation:	First cycle, has only upper-secondary level entry requirements (G1N)

Major Field of Study:
MTA (Mechanical Engineering)

Course Approval

The syllabus was approved by the Faculty of Health, Science and Technology 2024-09-12, and is valid from the Spring semester 2025 at Karlstad University.

Prerequisites

General admission requirements plus upper secondary level Mathematics 3C/D, Physics 2, and Chemistry 1, or equivalent

Learning Outcomes

The aim of the course is for students to obtain the basic knowledge of materials engineering needed to understand materials-related issues in design and manufacturing.

Upon completion of the course, students should be able to:

1. give an account of the main properties and key applications of common construction materials, as well as their classification and subdivision into subgroups,
2. give an account of various specific properties obtained during the manufacturing of a component, such as metallurgical processes, heat treatment, hot working, and cold working,
3. provide an overview of how changes in the structure of a material can affect its properties,

4. explain the advantages and disadvantages of each material group in relation to a given manufacturing process and application,
5. search for, evaluate, and discuss materials engineering information intended for design,
6. give an account of mechanical properties and mechanical testing,
7. describe and identify different types of fractures: brittle, ductile, creep, and fatigue fractures,
8. provide an overview of binary phase diagrams as well as isothermal and continuous transformation diagrams,
9. give an account of the most common types of corrosion in metallic materials,
10. correctly use basic materials engineering terminology in Swedish to discuss material issues with both materials specialists and non-specialists, and
11. comprehend materials engineering information in English.

Content

The course covers the areas of application for construction materials such as metals, ceramics, and polymers, and how the properties of these materials depend on their manufacturing processes. The course focuses on construction materials used in industrial applications. Instruction is in the form of lectures, laboratory sessions, and seminars. The lectures provide a theoretical background with examples of components and material selection. Laboratory sessions and seminars demonstrate practical applications for increased understanding.

Reading List

See separate document.

Examination

Assessment is based on a written exam, laboratory work, hand-in assignments, and seminars.

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 (Pass with Distinction), 4 (Pass with Some Distinction), 3 (Pass), or U (Fail) 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.