Faculty of Technology and Science
Materials Engineering

Syllabus

Course Approval
The syllabus was approved by the Faculty Board of Technology and Science on 4 July 2011 , and is valid from the Spring semester of 2012 at Karlstad University.

Course Code: MTGB16
Materials Engineering for Engineering Science, 7.5 ECTS Credits
(Materialteknik för civilingenjörer, 7.5 Swedish credit points)
Degree Level: Bachelor
Progressive Specialisation: G1F (First cycle, has less than 60 credits in first-cycle course/s as entry requirements)

Language of Instruction
Swedish

Prerequisites
The course Materia, 7.5 ECTS credits, or equivalent

Major Field of Study
MTA (Mechanical Engineering), TKA (Engineering Physics)

Learning Outcomes

The aim of the course is that students acquire basic knowledge of design materials in the main groups metals, polymers and ceramics. Students learn about the structure of engineering materias and the link between structure, process and properties as well as how materials are selected and used in designs.

Upon completion of the course, students should be able to:
- give an account of mechanical properties and mechanical testing,
- describe the structure of a engineering material at different structural levels,
- give an account of crystal defects and their importance in thermal and mechanical processes,
- give an account of the basic connection between structure and properties,
- use binary phase diagrams and isothermal and continuous transformation diagrams to interpret micro structures and describe their development in phase transformations,
- give an account of the purpose and method in common heat treatments,
- describe and identify different types of failure: brittle, ductile, creep and fatigue,
- describe and identify the most common types of corrosion in metallic materials,
- perform qualitative comparisons between materials and state application areas for the most common engineering materials in the various material groups,
- use foundational materials engineering terminology correctly in Swedish when discussing materials issues with materials experts as well as non-specialists,
- analyse and discuss an already made material selection for a design based on the knowledge introduced in the course.

Content and Form of Instruction

Main course content:
The course deals with mechanical properties and testing, deformation mechanisms, strengthening mechanisms, fractures, phase transformations, phase diagrams, transformation diagrams, heat treatment and, corrosion as well as the structure, properties and application areas for metallic, ceramic and polymer engineering materials. Students practice using light microscope, scanning electron microscope and equipment for mechanical testing (tensile testing, impact testing and hardness tests). Instruction is in the form of lectures, seminars and mandatory laboratory sessions.

Reading List

See separate document.

Examination

Assessment is based on a written exam, hand-in assignments and attendance at mandatory laboratory sessions.

Grades

One of the grades U (Fail), 3 (Pass), 4 (Pass with some distinction), or 5 (Pass with distinction) 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.

Karlstads universitet 651 88 Karlstad, Sweden
Tel +46-54-700 10 00 Fax +46-54-700 14 60
information@kau.se www.kau.se