



LUNDS UNIVERSITET
Lunds Tekniska Högskola

Course syllabus

Konstruktionsmaterial, allmän kurs **Materials Engineering, Basic Course**

FKMA01, 7,5 credits, G1 (First Cycle)

Valid for: 2023/24

Faculty: Faculty of Engineering, LTH

Decided by: PLED M

Date of Decision: 2023-04-11

General Information

Main field: Technology.

Compulsory for: M2, MD2

Elective Compulsory for: I3

Elective for: F4

Language of instruction: The course will be given in English

Aim

The aim of the course is to introduce the student to the basic concepts of Materials Science and their application to get desired properties in different materials such as metals and alloys, ceramics, polymers and composites.

Learning outcomes

Knowledge and understanding

For a passing grade the student must

- be familiar with different types of materials and their processing
- be aware of the relationships between structure and properties of materials.
- be aware of the environmental effects associated with the production and use of various materials and understand the importance of sustainable development.

Competences and skills

For a passing grade the student must

- demonstrate the abilities to study the mechanical behaviour of engineering materials
- plan materials processing treatments to attain desired properties.

Judgement and approach

For a passing grade the student must

- be able to choose suitable materials for common applications.
- be able to make written and oral presentations of materials science concepts and processes.

Contents

Material science basics. Atomic bonding, crystal structure and defects. Diffusion, plastic deformation, viscoelasticity, fatigue, creep, fracture, phase diagrams and phase transformations, corrosion and materials testing. Structure-Property Correlations. Metallic materials like steels, aluminium, copper, nickel and titanium alloys, Ceramics, Polymers, Composites and their characteristic properties, mechanical processing and heat treatment, applications. Materials and the environment, recycling. Choice of materials for various applications.

Examination details

Grading scale: TH - (U,3,4,5) - (Fail, Three, Four, Five)

Assessment: Written individual examination. Mandatory parts in the course are required to participate in the examination. Mandatory parts: laborations and some of the lectures and seminars. Optional online quizzes for continuous knowledge assessment. Detailed instructions about these will be disclosed in the course curriculum.

The examiner, in consultation with Disability Support Services, may deviate from the regular form of examination in order to provide a permanently disabled student with a form of examination equivalent to that of a student without a disability.

Parts

Code: 0117. **Name:** Materials Engineering, Basic Course.

Credits: 7,5. **Grading scale:** TH.

Code: 0217. **Name:** Laboratory Work.

Credits: 0. **Grading scale:** UG.

Admission

Assumed prior knowledge: Linear Algebra, Calculus in One Variable, Thermodynamics and Fluid Mechanics and a course in Physics.

The number of participants is limited to: No

Reading list

- William D. Callister Jr., David G. Rethwisch: Fundamentals of Materials Science and Engineering: An Integrated Approach, 6th Edition, International Adaptation. Wiley, 2022, ISBN: 978-1-119-82054-3.

Contact and other information

Course coordinator: Professor Dmytro Orlov, dmytro.orlov@material.lth.se

Course administrator: Rose-Marie Hermansson, rose-marie.hermansson@mel.lth.se

Course homepage: <http://www.material.lth.se>