Engineering Materials

Programme course

6 credits

Konstruktionsmaterial

TMKM86

Valid from: 2017 Spring semester

Determined by
Board of Studies for Industrial Engineering
and Logistics

Date determined
2017-01-25

Main field of study

Mechanical Engineering

Course level

First cycle

Advancement level

G2X

Course offered for

- Industrial Engineering and Management - International, M Sc in Engineering
- Industrial Engineering and Management, M Sc in Engineering

Entry requirements

Note: Admission requirements for non-programme students usually also include admission requirements for the programme and threshold requirements for progression within the programme, or corresponding.

Intended learning outcomes

This course aims at presenting students fundamentals in the field of materials science and engineering with emphasis on explaining the relationship between the structure of a material, its mechanical properties and its manufacturing process and industrial use of materials. Upon successful completion of the course, the student shall be able to:

- Explain and discuss the mechanical properties of metallic and polymer material based on their structure.
- Explain how the mechanical properties of a metallic material can be modified with the help of different manufacturing processes which induce changes in the material's structure.
- Describe the influence of temperature and aggressive environment on the use of material.
- Describe the typical properties of the material groups included in the course and their application areas.
- Analyze and discuss selection of materials for structure based on the knowledge

introduced in this course.

Course content

Main engineering material classes, atomic bonding, mechanical properties and testing methods.
Metallic materials: crystal structure, defects in crystals, mechanisms for strengthening, diffusion and case hardening, fracture, solidification, phase diagram, heat treatment, steel, cast iron, light alloys, superalloys, corrosion and prevention.
Polymer materials: structure and typical properties, glass transition of thermoplastics.
Group work to analyze an already made material selection.

Teaching and working methods

The course consists of lectures, tutorials, laboratory work and group work. A written examination is given at the end of the course.

Examination

LAB1	Laboratory exercises	U, G	3 credits
TEN1	Written examination	U, 3, 4, 5	3 credits

Grades

Four-grade scale, LiU, U, 3, 4, 5

Other information

Supplementary courses:
Polymer Materials, Experimental Evaluation of Fatigue and Fracture Properties, Engineering Materials - Optimization of Materials, Engineering Materials - Deformation and Fracture, Engineering Materials - New materials, LK Engineering Materials for Light Weight Applications

Department

Institutionen för ekonomisk och industriell utveckling

Director of Studies or equivalent

Mikael Segersäll

Examiner

Mattias Calmunger

Course website and other links

http://www.iei.liu.se/kmt/education/undergraduatecourses-tmkm86

Education components

Preliminary scheduled hours: 58 h
Recommended self-study hours: 102 h

Course literature

Additional literature

Books

Askeland, Donald R., Fulay, Pradeep P., Wright, Wendelin J., (2011) *The science and engineering of materials*
ISBN: 9780495296027,0495296023,9780495668022,0495668028
Stamford, CT : Cengage Learning, c2011

Common rules

Regulations (apply to LiU in its entirety)

The university is a government agency whose operations are regulated by legislation and ordinances, which include the Higher Education Act and the Higher Education Ordinance. In addition to legislation and ordinances, operations are subject to several policy documents. The Linköping University rule book collects currently valid decisions of a regulatory nature taken by the university board, the vice-chancellor and faculty/department boards.

LiU's rule book for education at first-cycle and second-cycle levels is available at http://styrdokument.liu.se/Regelsamling/Innehall/Utbildning_pa_grund-_och_avancerad_niva.