



LUNDS UNIVERSITET
Lunds Tekniska Högskola

Course syllabus

Material- och polymerteknologi

Materials and Polymer Technology

KASF05, 7,5 credits, G2 (First Cycle)

Valid for: 2023/24

Faculty: Faculty of Engineering, LTH

Decided by: PLED B/K

Date of Decision: 2023-04-18

General Information

Main field: Technology.

Compulsory for: K3

Language of instruction: The course will be given in English

Aim

- to provide the student with an overview of inorganic and polymer materials of technical importance and their applications, from an atomic and molecular perspective
- to give the student a deeper insight into the field of materials in a limited project.

Learning outcomes

Knowledge and understanding

For a passing grade the student must

- be able to describe the preparation and properties of metal alloys, ceramics and polymers of technical importance
- be able to explain how the microstructure at different levels affects the properties of materials
- be able to describe the principles of important methods for the characterization of materials

Competences and skills

For a passing grade the student must

be able to comprehend materials science literature.

Contents

The following points are treated:

- The mechanical properties of chemical bonds
- Crystal structures (positions, directions, planes)
- Crystal defects of varying dimensionality
- Dislocations and plastic deformation
- Point defects and diffusion
- Mechanical properties and different types of fracture
- The strengthening of metals and binary phase diagrams
- Important alloys based on iron, aluminium, copper and titanium
- Ceramics
- Classification, nomenclature and molecular weight concepts of polymers
- Mechanisms and concepts in step- and chain-growth polymerisation
- Industrial methods of polymerization
- Conformation and solubility of polymers
- Structure-property relationships in amorphous and semi crystalline polymers
- Mechanical properties of polymers, polymer blends and composites
- Processing and rheology of polymers
- Polymer applications: membranes and electronics

Examination details

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

Assessment: Written examination. Project completed. Examination results define grade. The teaching of the course takes the form of lectures, exercises and a compulsory literature study. The literature study is performed in a smaller group of students. Given a scientific review article in a modern materials field, one original article per student is selected. The group then gives an oral presentation of the review and their individual articles.

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.

Admission

Assumed prior knowledge: KOOA15 General Chemistry, KOKA25 Organic Chemistry and KASA10/KOO022 Inorganic Chemistry.

The number of participants is limited to: No

The course overlaps following course/s: KOO052

Reading list

- William D. Callister: Callister's Materials Science and Engineering, Global Edition. Wiley, 2020, ISBN: 978-1-119-45391-8.
- Fried, J.R.: Polymer Science & Technology, 3rd edition. Prentice Hall Ptr, 2014, ISBN: 978-0-13-703955-5.
- Hand-out material.

Contact and other information

Course coordinator: Professor Patric Jannasch, patric.jannasch@chem.lu.se

Course coordinator: Professor Kimberly Thelander, kimberly.thelander@ftf.lth.se

Course homepage: <https://canvas.education.lu.se/>