

SYLLABUS

Materials Technology and Materials Selection 7.5 credits T0003T

Materialteknik och materialval

Course syllabus admitted: Autumn 2023 Sp 1 - Spring 2024 Sp 4

**DECISION DATE
2021-02-17**

Materials Technology and Materials Selection 7.5 credits T0003T

Materialteknik och materialval

First cycle, T0003T

Education level	Grade scale	Subject	Subject group (SCB)
First cycle	G U 3 4 5	Materialteknik	Materials Technology

Entry requirements

In order to meet the general entry requirements for first cycle studies you must have successfully completed upper secondary education and documented skills in English language and Basic knowledge of materials science especially about metallic and polymer material, example T0004T Material Science and Engineering I or equivalent. Good knowledge in English, equivalent to English 6.

Selection

The selection is based on 1-165 credits.

Course Aim

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

- Describe microstructure, properties and areas of application of metals, polymers, composites and ceramics
- Describe common manufacturing methods for polymers, composites and ceramics. Describe the impact of manufacturing methods on the structure and properties of metallic materials
- Identify common polymeric materials and predict the impact of behavior of polymer melt on their properties. Calculate the mechanical properties of polymeric composites by use of micromechanics and laminate theory. Describe the constituents of polymeric composite materials and their effect on properties
- Explain basic corrosion theory, define corrosion types and describe different methods to prevent corrosion. Perform basic electrochemical calculations and predict corrosion using Pourbaix diagrams.
- Explain the basics regarding material selection methodology and relate to sustainability aspects including recycling. Analyze the coupling between manufacturing method, material selection and properties for each material
- Carry out a well-founded material selection by using systematic material selection methodology and based on product requirements, material properties and manufacturing methods
- Collaborate in groups when carrying out laboratory work and analyze the results, and present these orally and in a scientific manner in a written report.

Contents

Corrosion: Electrochemistry, corrosion types, corrosion control, oxidation and surface treatments

Polymer rheology and manufacturing methods. Identification of polymer materials.

Polymer composites manufacturing. Mechanical performance, micromechanics and laminate theory

The properties of ceramic materials related to structure, the different fabrication steps, machining and mechanical testing. Properties and areas of application for conventional ceramics, glass, glass ceramics, refractory ceramics and high performance ceramics.

Powder metallurgy, thermal and thermomechanical treatment of metallic materials. Influence of joining methods on the structures of metals.

Materials selection methodology.

Realization

Each course occasion's language and form is stated and appear on the course page on Luleå University of Technology's website.

Lectures, exercises and laboratory work. Participation in the laboratory exercises is compulsory.

Examination

If there is a decision on special educational support, in accordance with the Guideline Student's rights and obligations at Luleå University of Technology, an adapted or alternative form of examination can be provided. Written examination in the end of the course. Approval of Laboratory work.

Unauthorized aids during exams and assessments

If a student, by using unauthorized aids, tries to mislead during an exam or when a study performance is to be assessed, disciplinary measures may be taken. The term "unauthorized aids" refers to aids that the teacher has not previously specified as permissible aids and that may assist in solving the examination task. This means that all aids not specified as permissible are prohibited. The Swedish version has interpretative precedence in the event of a conflict.

Course offered by

Department of Engineering Sciences and Mathematics

Modules

Code	Description	Grade scale	Cr	Status	From period	Title
0002	Laboratory work	U G#	1.5	Mandatory	A07	
0003	Written exam	G U 3 4 5	6	Mandatory	A21	

Study guidance

Study guidance for the course is to be found in our learning platform Canvas before the course starts. Students applying for single subject courses get more information in the Welcome letter. You will find the learning platform via My LTU.

Last revised

by Head Faculty Programme Director Niklas Lehto 2021-02-17

Syllabus established

by Department of Applied Physics and Mechanical Engineering 2007-02-28