

SYLLABUS

Material Science and Engineering I 7.5 credits T0004T

Metalliska och Polymera material, grundkurs

Course syllabus admitted: Autumn 2023 Sp 1 - Autumn 2023 Sp 2

**DECISION DATE
2021-06-16**

Material Science and Engineering I 7.5 credits T0004T

Metalliska och Polymera material, grundkurs

First cycle, T0004T

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

Main field of study

Industrial Design Engineering

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 +

Upper secondary school courses English 6, Physics 2, Chemistry 1, Mathematics 3c or Mathematics D.

Selection

The selection is based on final school grades or Swedish Scholastic Aptitude Test.

Course Aim

After completing the course, the student should be able to:

- Describe the crystal structure of metallic materials and polymer structures.
- Draw conclusions about the mechanical properties of materials from diagrams and relate these to the microstructure of the material.
- Describe the performance of different test methods and be able to predict the information they provide.
- Correlate how properties depend on manufacturing methods and structure.
- Interpret and draw conclusions from information from phase diagrams.
- Assess how different heat treatment methods affect structure and properties.
- Describe the basics of corrosion, describe different types of corrosion and reason about different protection against corrosion.
- Be able to draw conclusions about material selection by reasoning according to the material choice methodology, and make material selections with regard to societal and ethical aspects and with insight into the possibilities and limitations of technology.

Contents

The course contains basic materials science about metallic and polymeric materials.

Metals (70%):

Properties of metals: Crystallography and crystal defects (including simple dislocation theory). Diffusion and reaction kinetics.

Mechanical properties, plastic deformation and fracture. Curing mechanisms. Alloys, phase diagrams and solid transformations.

Steel and its heat treatment: Structural components, alloying elements and heat treatment.

Corrosion: Basic concepts, types of corrosion and protection.

Material selection: Basics of Material selection methodology

Polymers (30%):

Consumption, use, construction, amorphous thermoplastics, semi-crystalline thermoplastics and thermosets. Characteristic mechanical properties and viscoelasticity. Composites, rubbers, shaping methods, additives and material knowledge.

Realization

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

The teaching consists of lectures, lessons and laboratory work as well as assignments. Assignments and laboratory work are mandatory. The lessons deal with the application of the theory in connection with problem solving.

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 exam and compulsory laborations and homework .

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.

Overlap

The course T0004T is equal to T0021T, MPM032, T0006T, T0005T

Course offered by

Department of Engineering Sciences and Mathematics

Modules

Code	Description	Grade scale	Cr	Status	From period	Title
0005	Laboratory work	6 U G VG 3 4 5 *	1.5	Mandatory	A18	
0007	Seminar work and Material selection	U G#	1	Mandatory	A21	
0008	Written exam	G U 3 4 5	5	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 Niklas Lehto, Head Faculty Programme Director 2021-06-16

Syllabus established

by Department of Applied Physics and Mechanical Engineering 2003-01-08