

**SYLLABUS**

# **Phase Transformations 7.5 credits T7008T**

**Fasomvandlingar**

**Course syllabus admitted: Autumn 2023 Sp 1 - Present**

**DECISION DATE  
2021-02-17**

# Phase Transformations 7.5 credits T7008T

## Fasomvandlingar

### Second cycle, T7008T

**Education level**  
Second cycle

**Grade scale**  
G U 3 4 5

**Subject**  
Materialteknik

**Subject group (SCB)**  
Materials Technology

## Main field of study

Materials Science and Engineering

## Entry requirements

Basic knowledge of materials science

## Selection

The selection is based on 30-285 credits

## Course Aim

After the course the student should be able to deal with the important principles of phase transformation. Focusing on the basic theory of the interaction of defects (vacancies, dislocations, interphase interfaces etc), general laws of phase transformation and mutual effects between composition, microstructure and macroproperties of engineering materials such as metallic alloys and ceramics. The student should also have a good knowledge of composition design, microstructure development and property improvement, as well as the newest development of materials and methods of doing research in materials science.

## Contents

Theoretical background 1. Thermodynamics and kinetics of alloys: binary and ternary systems; kinetics of transformation. 2. Diffusion: interstitial and substitutional diffusion, the relationship between macroscopic diffusion and atomic mechanisms; mass transfer in porous materials and other transport phenomena. 3. Interfaces and surfaces: structures and properties of surfaces, grain boundaries and interphase interfaces, the effect of interfaces on transformation. 4. Solidification: Nucleation in pure metals, growth of a pure solid and alloy solidification. 5. Diffusional transformation: general theory of nucleation and growth; important phase transformations such as precipitate, massive, spinodal, ordering transformation etc; transformation of steels. 6. Diffusionless transformations: the crystallography and kinetics of nucleation and growth of Martensite transformation.

## Realization

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

Lectures and seminars.

## 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 at the end of the course

## 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 T7008T is equal to MPM036

## Course offered by

Department of Engineering Sciences and Mathematics

## Modules

Code	Description	Grade scale	Cr	Status	From period	Title
0002	Written exam	G U 3 4 5	7.5	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 Head Faculty Programme Director Niklas Lehto 2021-02-17

## Syllabus established

The syllabus was established by the Department of Applied Physics and Mechanical Engineering 2007-02-28, and remains valid from autumn 2007.