



COURSE SYLLABUS

Microstructural Engineering, 7.5 credits

Microstructural Engineering, 7,5 högskolepoäng

Course Code: TMES22	Education Cycle: Second-cycle level
Confirmed by: Dean Mar 1, 2021	Disciplinary domain: Technology
Valid From: Jan 1, 2022	Subject group: MA2
Version: 1	Specialised in: A1F

Intended Learning Outcomes (ILO)

After a successful course, the student shall:

Knowledge and understanding

- demonstrate comprehension of the relation between thermodynamics and phase diagrams
- demonstrate comprehension of the mechanisms of diffusion
- demonstrate comprehension of the principles of phase transformations and the role of interfaces for solidification and solid-state transformations

Skills and abilities

- demonstrate skills of describing the phase selection, nucleation and growth of phases
- demonstrate the ability to use thermodynamics for predicting phase diagrams

Judgement and approach

- demonstrate the ability to quantitatively describe the details and mechanisms of diffusion
- demonstrate an understanding of a quantitative description of the selection of type and generation of the scale of microstructure during processing
- demonstrate the ability to decide a suitable route to achieve the desired engineered microstructure

Contents

The core concept of this course is the detailed description and understanding of the principles of phase transformation in metals and alloys.

The course includes the following elements:

- Thermodynamics and phase diagrams
- Diffusion
- Crystal interfaces and microstructure
- Solidification
- Diffusional transformations in solids
- Diffusionless transformations.

Type of instruction

Lectures, laboratory sessions and/or project work, and assignments/quizzes.

The teaching is conducted in English.

Prerequisites

Passed courses at least 90 credits within the major subject Mechanical Engineering, 15 credits Mathematics, and completed courses in Materials and Manufacturing, 7,5 credits and Thermodynamics, 7,5 credits, proof of English proficiency is required (or the equivalent).

Examination and grades

The course is graded 5,4,3 or Fail.

Registration of examination:

Name of the Test	Value	Grading
Assignments	2 credits	U/G
Quizzes	2 credits	U/G
Examination ¹	3.5 credits	5/4/3/U

¹ Determines the final grade of the course, which is issued only when all course units have been passed.

Course literature

The literature list for the course will be provided 8 weeks before the course starts.

Porter and Easterling, Phase transformations in metals and alloys, Third Edition, CRC Press, 1992

Selected publications will be made available during the course.