

COURSE SYLLABUS

Metallic Materials: from Phase Transformation to Characterization, 7.5 credits

Metalliska Material: från fasomvandling till karakterisering, 7.5 högskolepoäng

Course Code: TMMS25	Education Cycle: Second-cycle level
Confirmed: Feb 01, 2025	Disciplinary domain: Technology
Valid From: Sep 01, 2025	Subject group: Materials Technology
	Specialised in: A1F Second cycle, has second-cycle course/s as entry requirements
	Main field of study: Product Development

Intended Learning Outcomes (ILO)

On completion of the course the student shall:

Knowledge and understanding

- demonstrate comprehension of the relationship between structure and material properties
- demonstrate comprehension of the principles of phase transformations
- display knowledge of appropriate measurement techniques and equipment to determine material properties and characterize microstructure

Skills and abilities

- demonstrate ability to explain an engineered microstructure
- demonstrate the ability to evaluate material characterization data

Judgment and approach

- demonstrate the ability to decide a suitable route to achieve the desired engineered microstructure
- demonstrate an understanding of sound judgement regarding validity of measurements and calculated predictions

Content

The course covers the basic principles of phase transformation in metals and alloys and the methods of evaluating material properties and the microstructure. The influence of heat treatments and/or mechanical treatments on the microstructure of metallic materials are investigated together with the relationship between the achieved microstructure and the material properties.

The course includes the following elements:

- Diffusion
- Heat treatment
- Diffusional and diffusion less transformations in solids
- The relationship between structure and material properties
- Mechanical tests of static and dynamic properties
- Analytical methods for thermo-physical properties
- Chemical characterization of materials

Type of instruction

Lectures, laboratory sessions and assignments/quizzes.

Language of instruction is in English.

Entry requirements

Passed courses of at least 150 credits in the program Industrial Product Realisation, or passed courses of at least 90 credits in Materials and Manufacturing, Materials Engineering, Mechanical Engineering, Chemical Engineering, Product Development, Engineering Physics or the equivalent. The bachelor's degree should comprise a minimum of 15 credits in Mathematics. Taken course in Chemical Thermodynamics, 7,5 credits, or the equivalent. Proof of English proficiency is required.

Examination and grades

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

Registration of examination:

Name of the Test	Value	Grading
Examination ¹	4.5 credits	5/4/3/U
Laboratory	2 credits	G/U
Assignment	1 credit	G/U

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

Course literature

Please note that changes may be made to the reading list up until eight weeks before the start of the course.

D.A. Porter, K.E. Easterling and M.Y. Sherif, Phase transformations in metals and alloys, Third Edition, CRC Press, 1992.