

## COURSE SYLLABUS

**Manufacturing Process Simulations, 7.5 credits***Simulering av tillverkningsprocesser, 7.5 högskolepoäng*


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Course Code: TTPS25	Education Cycle: Second-cycle level
Confirmed: Feb 01, 2025	Disciplinary domain: Technology
Valid From: Jan 19, 2026	Subject group: Materials Technology
	Specialised in: A1F Second cycle, has second-cycle course/s as entry requirements
	Main field of study: Product Development

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**Intended Learning Outcomes (ILO)**

On completion of the course the student shall:

**Knowledge and understanding**

- show familiarity with different manufacturing process simulation software and numerical approaches to simulate manufacturing processes
- display knowledge of the application of manufacturing process simulations in the product realisation process for efficient and sustainable manufacturing
- demonstrate comprehension of the connection between the manufacturing process and the requirements of the product design and geometry

**Skills and abilities**

- demonstrate skills in using manufacturing process simulations in an integrated product optimisation and product realisation process perspective
- demonstrate the ability to perform manufacturing process simulations for products of different material types

**Judgment and approach**

- demonstrate the ability to critically evaluate and interpret the results of process simulations to improve and optimise the manufacturability of the product
- demonstrate an understanding of the strengths and drawbacks of different numerical techniques and approaches to manufacturing simulation

**Content**

The course covers the use of powerful simulation tools to optimise manufacturing processes and develop sustainable, high-quality products. Students will explore simulations of various processes, including metal casting, plastic injection moulding, and plating operations, to predict material properties and refine product designs. With a strong industry connection, the course includes a project where students apply their knowledge to real-world manufacturing challenges. Examples are drawn from industrial manufacturing processes, with a particular focus on metal casting and polymer injection moulding.

The course includes the following elements:

- Simulation of manufacturing processes, with a particular focus on casting
- Optimization of geometry and process parameters for high-quality manufacturing and minimisation of defects
- Introduction to modelling and simulation of flow, microstructure formation and prediction of mechanical properties

- Modelling and simulation of multiphysics problems, including temperature phase change, convection and electrical fields

## Type of instruction

Lectures, computer assignments, and project work.

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 Metallic Materials: from Phase Transformation to Characterization, 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
Project <sup>1</sup>	3.5 credits	5/4/3/U
Assignment	4 credits	G/U

<sup>1</sup>Determines 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.

Relevant literature is provided during the course lapse.