JÖNKÖPING UNIVERSITY
School of Engineering

COURSE SYLLABUS

Simulations for Integrated Product Realization, 7.5 credits

Simuleringar för integrerad produktframtagning, 7.5 högskolepoäng

Course Code:	T2SFIP	Education Cycle:	Second-cycle level
Confirmed:	Sep 01, 2025	Disciplinary domain:	Technology
Valid From:	Jan 18, 2027	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

- show familiarity with different manufacturing process simulation software and numerical approaches to simulate manufacturing processes
- display knowledge of the application and integration of manufacturing process simulations in the engineering design and product realisation process for efficient and sustainable manufacturing of products
- 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 realisation and product optimisation process perspective
- demonstrate the ability to perform manufacturing process simulations for products of different material types

Judgement 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 manufacturing processes, including metal casting and plastic injection moulding, to predict material properties and other effects of the process on the manufactured parts. These effects are then integrated into FEM simulations of the part in use. The use of Design of Experiments and optimization techniques to optimize the part geometry and process variables are explored.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 and polymer injection moulding

- Introduction to modelling and simulation of flow, microstructure formation and prediction of mechanical properties and residual stresses
- Optimization of geometry and process parameters for high-quality manufacturing and minimisation of defects
- Modelling and simulation of multiphysics problems

Type of instruction

Lectures, computer assignments, and project work.

Language of instruction is 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 or Engineering Physics or equivalent. The bachelor's degree should comprise a minimum of 15 credits in Mathematics. Taken courses in Thermodynamics and Physical Metallurgy, 7,5 credits, Computational Fluid Dynamics for Manufacturing Processes, 7,5 credits, Liquid Metal processing, 7,5 credits, and Applied Materials Testing and Characterization for Engineers, 7,5 credtis, or 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 [1]	3.5 credits	5/4/3/U
Assignment	4 credits	G/U

[1]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.