

COURSE SYLLABUS

Optimization for Minimal Material Utilization of Cast Components, 2.5 credits

Optimering för minimal materialanvändning av gjutna komponenter, 2,5 högskolepoäng

Course Code: T2OFMM	Education Cycle: Second-cycle level
Confirmed: May 06, 2026	Disciplinary domain: Technology
Valid From: Jan 18, 2027	Subject group: Mechanical Engineering
	Specialised in: A1N Second cycle, has only first-cycle course/s as entry requirements
	Main field of study: Mechanical Engineering

Intended Learning Outcomes (ILO)

On completion of the course the student shall:

Knowledge and Understanding

- demonstrate knowledge of how parameter and topology optimization can be applied to cast metal components
- demonstrate comprehension of how manufacturing-related effects can influence the structural performance of optimized cast components

Skills and Abilities

- demonstrate the ability to formulate and solve a material-reduction optimization problem for a cast component, including objectives, design variables and constraints

Judgement and Approach

- demonstrate the ability to critically evaluate optimization results of cast components in relation to design requirements

Content

The course provides practical skills in design optimization of cast metal components with consideration of manufacturing-related effects. The course focuses on iterative optimization, redesign, casting simulation, transfer of manufacturing results to structural analysis models, and verification.

The course includes the following elements:

- Optimization, objective functions, constraints and design variables
- Casting simulation, mapping of manufacturing-related results
- Material reduction under design requirements
- Post-processing and redesign of optimized cast geometries

Type of Instruction

Online lectures and tutorials, computer-based assignments, and exercises.

Language of instruction is English.

Entry Requirements

Passed courses corresponding to 180 credits in first-cycle studies, including at least 90 credits within the main field of Mechanical Engineering OR passed courses of at least 40 ECTS in the main field of study within Engineering and/or Technology and at least 1 year of work experience within Mechanical Engineering industry OR at least 4 years of work experience within Mechanical Engineering industry. Proof of English proficiency is required. Basic Finite Element Analysis (FEA) or Finite Element Method (FEM) proficiency is required. Basic CAD proficiency is recommended.

Examination and Grades

The course is graded Pass (G) or Fail (U).

Registration of examination:

Name of the Test	Value	Grading
Assignment	2.5 credits	G/U

Course Literature

Please note that the course literature may be revised up to eight weeks before the start of the course.

Recorded lectures, online tutorials and other course materials are available on Canvas.