COURSE SYLLABUS
Multidisciplinary Optimization, 7.5 credits

Multidisciplinär optimering, 7,5 högskolepoäng

Course Code:	TMOR23	**Education Cycle:**	Second-cycle level
Confirmed by:	Dean Mar 1, 2023	**Disciplinary domain:**	Technology
Valid From:	Aug 1, 2023	**Subject group:**	MT1
Version:	1	**Specialised in:**	A1N
		Main field of study:	Product Development

Intended Learning Outcomes (ILO)

After a successful course, the student shall;

Knowledge and understanding
- display knowledge of different types of optimization algorithms and their use.
- display knowledge in different types of optimization techniques during the design process.
- show understanding about how optimization driven design is used in the development of sustainable products.

Skills and abilities
- demonstrate skills in using software for parameter optimization in product design
- demonstrate the ability to implement different optimization algorithms
- demonstrate the ability to implement the optimization process into a product development process
- demonstrate the ability to develop methods to solve real-world optimization problems

Judgement and approach
- demonstrate the ability to critically assess the validity of optimization results.

Contents

The course enables the students to apply optimization on top of automated engineering process to optimize aspects of product design. This is achieved by using both classical optimization algorithms and software for modelling objective functions by using one software as input to another.

The course includes the following elements:
• Introduction to optimization driven design: Parameter optimization, Structural optimization
• The steepest descent method, Newton's method, Karush-Kuhn-Tucker conditions (KKT), linear programming, the Simplex method.
• Optimization algorithms: deterministic: gradient based algorithms, direct methods, stochastic: heuristic and meta-heuristic algorithms

- Multi-objective non-linear optimization and their industrial applications
- Topology optimization using commercial software
- Computer supported modelling of optimization problems

Type of instruction

Lectures, labs and project work.

The teaching is conducted in English.

Prerequisites

Passed courses 180 credits in first cycle, at least 90 credits within the major subject Mechanical Engineering, Industrial Engineering and Management or Civil Engineering, and 15 credits in Mathematics. Proof of English proficiency is required. CAD course or equivalent is required (or the equivalent).

Examination and grades

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

The final grade of the course is a weighted grade based on the results from the assignments and written examination and is issued only when all course units have been passed.

Registration of examination:

Name of the Test	Value	Grading
Assignment	4.5 credits	5/4/3/U
Examination	3 credits	5/4/3/U

Course literature

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

Reference literature:
Title: Algorithms for Optimization
Author: Kochenderfer M.J., Wheeler T.A
Publisher: MIT Press, 2019
ISBN: 9780262039420