KURSPLAN
Multidisciplinär optimering, 7,5 högskolepoäng

Multidisciplinary Optimization, 7.5 credits

Kurskod:	TMOR23	**Utbildningsnivå:**	Avancerad nivå
Fastställd av:	VD 2023-03-01	**Utbildningsområde:**	Tekniska området
Gäller fr.o.m.:	2023-08-01	**Ämnesgrupp:**	MT1
Version:	1	**Fördjupning:**	A1N
		Huvudområde:	Produktutveckling

Lärandemål

After a successful course, the student shall;

Kunskap och förståelse
- 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.

Färdighet och förmåga
- 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

Värderingsförmåga och förhållningssätt
- demonstrate the ability to critically assess the validity of optimization results.

Innehåll

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

Undervisningsformer

Lectures, labs and project work.

Undervisningen bedrivs på engelska.

Förkunskapskrav

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 och betyg

Kursen bedöms med betygen 5, 4, 3 eller Underkänd.

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.

Poängregistrering av examinationen för kursen sker enligt följande system:

Examinationsmoment	Omfattning	Betyg
Inlämningsuppgift	4,5 hp	5/4/3/U
Tentamen	3 hp	5/4/3/U

Kurslitteratur

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