



## COURSE SYLLABUS

# Optimization Driven Design, 7.5 credits

*Optimeringsdriven design, 7,5 högskolepoäng*

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<b>Course Code:</b> TODS29	<b>Education Cycle:</b> Second-cycle level
<b>Confirmed by:</b> Dean Dec 1, 2018	<b>Disciplinary domain:</b> Technology
<b>Valid From:</b> Jan 1, 2019	<b>Subject group:</b> MT1
<b>Version:</b> 1	<b>Specialised in:</b> A1F
	<b>Main field of study:</b> Product Development

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### Intended Learning Outcomes (ILO)

After a successful course, the student shall;

Knowledge and understanding

- show familiarity with basic optimization algorithms and their use.
- display knowledge about how structural and design optimization can be used during the design process
- demonstrate comprehension of how optimization driven design is used in the development of sustainable products.

Skills and abilities

- demonstrate the ability to use topology optimization in structural analyses
- demonstrate the ability to perform sensitivity analyses.

Judgement and approach

- demonstrate the ability to perform a major optimization driven design project.

### Contents

The course includes the following elements:

- Introduction to optimization driven design; linear programming.
- Unconstrained optimization; the steepest descent method, Newton's method, secant methods.
- Constrained optimization; Karush-Kuhn-Tucker conditions, quadratic programming, active set strategies, penalty and barrier function methods.
- Convex optimization and variational inequalities, with applications in mechanical engineering.
- Structural optimization; distributed parameter systems, shape and topology optimization.

### Type of instruction

Lectures, computer assignments, given in English.

The teaching is conducted in English.

### Prerequisites

Passed courses 180 credits in first cycle, at least 90 credits within the major subject Mechanical Engineering, and 21 credits Mathematics, and completed course Non-linear Finite Element Analysis, 6 credits. Proof of English proficiency is required (or the equivalent).

### Examination and grades

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

Registration of examination:

Name of the Test	Value	Grading
Written examination	5 credits	5/4/3/U
Laboratory work	2.5 credits	U/G

### Course literature

Lecture notes distributed digitally.