KURSPLAN
FEA och optimeringsdriven design, 7,5 högskolepoäng

FEA and Optimization Driven Design, 7.5 credits

Kurskod:	TFOS22	**Utbildningsnivå:**	Avancerad nivå
Fastställd av:	VD 2022-03-01	**Utbildningsområde:**	Tekniska området
Gäller fr.o.m.:	2022-08-01	**Ämnesgrupp:**	MT1
Version:	1	**Fördjupning:**	A1F
		Huvudområde:	Produktutveckling

Lärandemål

After a successful course, the student shall:

Kunskap och förståelse
• show familiarity with basic optimization algorithms and their use
• demonstrate comprehension of how optimization driven design is used in the development of sustainable products
• show familiarity with the current state of the art within the area of design optimization.

Färdighet och förmåga
• demonstrate the ability to implement selected optimization algorithms in software
• demonstrate the ability to formulate and solve structural optimization problems with finite element analysis
• demonstrate the ability to conduct parameter optimization with finite element method
• demonstrate the ability to perform engineering calculations with optimization methods for small problems

Värderingsförmåga och förhållningssätt
• demonstrate the ability to perform sensitivity analyses
• demonstrate the ability to judge whether FE simulation/optimization results are reasonable or not

Innehåll

The aim of the course is to provide knowledge and ability to perform engineering calculations with optimization methods. The student will formulate, implement and solve optimization problems.

The course includes the following elements:
- Optimization methods for constrained and unconstrained problems.
- Gradient and non-gradient optimization methods.
- Finite element method for optimization problems.
- Sensitivity analysis and design of experiments.

- Structural (shape and topology) and process optimization for components manufactured e.g. from metal alloys and polymers.Calculations with optimization methods for small problems
- Implementation of selected optimization algorithms in MATLAB.
- Simulation-based optimization laboratory sessions using a commercial finite element software.

Undervisningsformer

Lectures, computer assignments, exercises.

Undervisningen bedrivs på engelska.

Förkunskapskrav

Passed courses at least 90 credits within the major subject Mechanical Engineering, 15 credits Mathematics included multivariable calculus and completed courses in Numerical Analysis, 7,5 credits and Continuum Mechanics, 7,5 credits, proof of English proficiency is required (or the equivalent).

Examination och betyg

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

Poängregistrering av examinationen för kursen sker enligt följande system:

Examinationsmoment	Omfattning	Betyg
Inlämningsuppgifter via datorn	5 hp	U/G
Skriftlig tentamen[I]	2,5 hp	5/4/3/U

[I] Bestämmer kursens slutbetyg vilket utfärdas först när samtliga moment godkänts.

Kurslitteratur

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