

Design Optimization					
Module-No./Abbreviation	Credits	Workload	Term	Frequency	Duration
CE-WP15/DO	6 CP	180 h	3 rd Sem.	Winter term	1 Semester
Courses Design Optimization			Contact hours 4 SWS (60 h)	Self-Study 120 h	Group Size: No Restrictions
Prerequisites -					
<p>Learning goals / Competences</p> <p>Goals include the acquisition of skills in design optimization and the ability to model, solve and evaluate optimization problems for moderately complex technical systems and other related optimization problems. The programming project increases the social skills that are necessary to successfully complete a team project. Also, the programming project allows students to transfer theoretical knowledge gained from the lecture into practical solutions solved with software.</p> <p>After successfully completing the module, the students</p> <ul style="list-style-type: none"> • will have a basic understanding of the theoretical fundamentals of numerical and mathematical optimization problems, • are able to apply optimization techniques to solve real world problems in engineering, computer science and other fields with mathematical specifications, • will be able to discuss optimization problems and possible solutions with expert team members as well as informed laypersons, • can evaluate optimization problems by selecting applicable optimization techniques and implement solutions using state-of-the-art software frameworks, • will be able to convey the importance of optimization to future clients, co-workers, managers. 					
<p>Content</p> <ul style="list-style-type: none"> • Introduction: Definition of optimization problems • Design of a process: conventional design, optimization as a design tool • Optimization from a mathematical viewpoint: Numerical approaches, linear optimization, convex domains, partitioned domains • Categories of opt. variables: Explicit design variables, synthesis and analysis, discrete and continuous variables, shape variables • Dependent design variables • Realization of constraints: Explicit and implicit constraints, constraint transformation, equality constraints • Optimization criterion: Objectives in structural engineering • Application of design optimization in structural engineering: trusses and beams, framed structures, plates and shells, mixed structures • Solution techniques: Direct and indirect methods, gradients, Hessian Matrix, Kuhn-Tucker conditions • Team Programming Project in Design Optimization (seminar paper) 					
<p>Teaching methods / Language</p> <p>Lecture (2h / week), Exercises (2h / week) / English</p>					
<p>Mode of assessment</p> <p>Homework (presentation, 100%)</p>					

Requirement for the award of credit points Passed presentation
Module applicability MSc. Computational Engineering
Weight of the mark for the final score 6 %
Module coordinator and lecturer(s) Prof. Dr.-Ing. M. König
Further information