Optimization Aided Design - Reinforced Concrete

Module-No./Abbreviation	Credits	Workload	Term	Frequency	Duration
CE-WP02/OAD-RC	6 CP	180 h	2nd Sem.	Summer term	1 Semester

Courses	Contact hours	Self-Study	Group Size:
Optimization Aided Design - Reinforced Concrete	4 SWS (60 h)	120 h	No Restrictions

Prerequisites
Basic knowledge in structural engineering, mechanics of beam and truss structures, reinforced concrete design and material properties matrices.

Learning goals / Competences
The students should be able to understand and apply the fundamental principles in calculating and designing reinforced concrete (RC) members and structures. They should gain special knowledge in the application of optimization aided design for concrete engineering.

After successfully completing the module the students

- should understand the design of reinforced concrete structures and members as well as cross-sections using optimization methods
- should be able to derive and optimize RC structures and members for given constraints, e.g. design space, loads and boundaries

Content
The module includes the following topics:

- principles and safety concept
- bending design
- strut-and-tie-modelling
- fundamentals of structural optimization
- outer form finding for the identification of structures
  - using one or bi-material topology optimization
  - steering of stresses and material, respectively
- internal form finding for effective reinforcements
  - using continuum, truss or hybrid topology optimisation
- design of cross-sections using optimisation methods

Teaching methods / Language
Lecture (2h / week), Exercises (2h / week) / English

Mode of assessment
Written examination (90 min, 100%) / Optional seminar papers, partially with presentations, to get bonus points for the exam (60 hours, deadlines will be announced at the beginning of the semester)

Requirement for the award of credit points
Passed final module examination and passed Homework

Module applicability (in other study programs)
MSc. Computational Engineering

Weight of the mark for the final score
6 %

Module coordinator and lecturer(s)
Prof. Dr.-Ing. P. Mark, Assistants

Further information