Optimization Aided Design - Reinforced Concrete

<table>
<thead>
<tr>
<th>Module-No./Abbreviation</th>
<th>Credits</th>
<th>Workload</th>
<th>Term</th>
<th>Frequency</th>
<th>Duration</th>
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</thead>
<tbody>
<tr>
<td>CE-WP02/OAD-RC</td>
<td>6 CP</td>
<td>180 h</td>
<td>2nd Sern.</td>
<td>Summer term</td>
<td>1 Semester</td>
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<tr>
<th>Courses</th>
<th>Contact hours</th>
<th>Self-Study</th>
<th>Group Size:</th>
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<tbody>
<tr>
<td>Optimization Aided Design - Reinforced Concrete</td>
<td>4 SWS (60 h)</td>
<td>120 h</td>
<td>No Restrictions</td>
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**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