### Advanced Finite Element Methods

<table>
<thead>
<tr>
<th>Module-No./Abbreviation</th>
<th>Credits</th>
<th>Workload</th>
<th>Term</th>
<th>Frequency</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE-WP04/FEM-II</td>
<td>6 CP</td>
<td>180 h</td>
<td>2nd Sem.</td>
<td>Summer term</td>
<td>1 Semester</td>
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<table>
<thead>
<tr>
<th>Courses</th>
<th>Contact hours</th>
<th>Self-Study</th>
<th>Group Size:</th>
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<tbody>
<tr>
<td>Advanced Finite Element Methods</td>
<td>4 SWS (60 h)</td>
<td>120 h</td>
<td>No Restrictions</td>
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### Prerequisites
Finite Element Methods in Linear Structural Mechanics (CE-P05), Basic knowledge in Structural Mechanics

### Learning goals / Competences
After successfully completing the module, the students understand the origins and implications of nonlinearities in structural mechanics:

- are able to formulate and solve nonlinear engineering problems with the finite element method accounting for geometrical and material nonlinearities
- can perform structural analyses, where the linear (1st order) theory is not valid (e.g. cables, membrane structures, load bearing and stability analyses beyond limit loads), and they can assess the results.

### Content
The main topics of the course are:

- formulation and finite element discretization of the basic equations for nonlinear materials and geometrically nonlinear analysis in structural mechanics
- development of algorithms for the solution of the underlying nonlinear material and structural equations
- application to analyze the structural behavior considering material nonlinearity and large deformations
- nonlinear stability analysis of structures

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

### Mode of assessment
Written examination (120 min, 100%)

### Requirement for the award of credit points
Passed final module examination

### Module applicability
MSc. Computational Engineering, MSc. Bauingenieurwesen

### Weight of the mark for the final score
6 %

### Module coordinator and lecturer(s)
Prof. Dr. Roger A. Sauer, Assistants

### Further information

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