

Finite Element Method for Nonlinear Analyses of Materials and Structures					
Module-No./Abbreviation	Credits	Workload	Term	Frequency	Duration
CE-WP06/FEM-III	3 CP	90 h	2 nd Sem.	Summer term	1 Semester
Courses Finite Element Method for Nonlinear Analyses of Inelastic Materials and Structures			Contact hours 2 SWS (30 h)	Self-Study 60 h	Group Size: No Restrictions
Prerequisites Basic knowledge of tensor analysis, continuum mechanics and linear Finite Element Methods is required; participation in the lecture „Advanced Finite Element Methods” (CE-WP04) is strongly recommended.					
Learning goals / Competences After successfully completing the module, the students <ul style="list-style-type: none"> • know methods for the modeling of elastoplastic materials, • have skills to select appropriate numerical methods and material models for practical problems and they can assess the limitations of the selected approaches. 					
Content The course is concerned with inelastic material models including their algorithmic formulation and implementation in the framework of nonlinear finite element analyses. Special attention will be paid to efficient algorithms for physically nonlinear structural analyses considering elastoplastic models for metals, soils and concrete as well as damaged based models for brittle materials. As a final assignment, the formulation and implementation of inelastic material models into an existing finite element program and its application to nonlinear structural analyses will be performed in autonomous teamwork by the participants.					
Teaching methods / Language Lecture including Exercises (2h / week) / English					
Mode of assessment Project work (implementation of nonlinear material models) and final student presentation within the scope of a seminar (100%)					
Requirement for the award of credit points Passed project work and final student presentation					
Module applicability MSc. Computational Engineering					
Weight of the mark for the final score 3 %					
Module coordinator and lecturer(s) Prof. Dr. Roger A. Sauer, Assistants					
Further information					