Department	03 Mechanical, Automotive and Aeronautical Engineering
Course title	**Impact Simulation of Vehicle Structures**
Hours per week (SWS)	4
Number of ECTS credits	6
Course objective	• Profound understanding of nonlinearities in solid me-chanics. • Profound understanding of solution methods for non-linear problems. • Profound understanding of methods for time integra-tion for dynamic problems. • Ability to choose an appropriate numerical method for the solution of a problem setting in the field of nonlin-ear dynamics. • Ability to perform basic impact simulations with a com-mercial code (lab). • Ability to validate results of numerical impact simula-tions and to asses towards plausibility. • Ability to integrate impact/crash simulations into the development process in a constructive manner.
Prerequisites	Engineering Mechanics, Dynamics, Advanced Mechanics of Materials, Basics of Material Engineering, Introduction into FEM.
Recommended reading	• Script for download for enrolled students. • S.R. Wu, L. Gu: Explicit finite element method for non-linear transient dynamics, Wiley 2012. • S.J. Hiermeier: Structures under Crash and Impact, Springer 2008. • T. Belytschko, W.K. Liu, B. Moran, K.I. Elkhodary: Non-linear finite elements for continua and structure, Wiley, 2014.
Teaching methods	Lecture, exercise, lab
Assessment methods	Project Thesis
Language of instruction	English
Name of lecturer	Prof. Dr.-Ing. Markus Gitterle
Email	markus.gitterle@hm.edu
Link	
Course content	• Nonlinearities in solid mechanics (general, geometrical nonlinearities, nonlinear materials, contact and fric-tion). • Methods for numerical treatment of nonlinearities, focal point on contact nonlinearities. • Methods for discretization in time, implicit and explicit methods, requirements for numerical simulation of highly dynamic problems (impact, crash). • Application of methods learnt with a commercial code (LS-DYNA), examples with main focus on crash analy-sis, validation on basis of analytical methods.
Remarks	