Module number	Module name	Module coordinator
BIW-MA-AC-O-03	Energy Methods, Finite Element Method	Prof. Dr. Michael Kaliske statik@mailbox.tu-dresden.de
Learning goals	The students have a deep knowledge about energy methods, the basis of the Finite-Element-Method (FEM) as well as the modelling of linear and non-linear FEM. They are able to apply the theoretical knowledge of the methods on their own.	
Content	Contents of the module are themes with respect to variational calculus, tensor computations, principles of minimization of the potential energy, approximate solutions according to Ritz and Galerkin, energetic stability criteria and their applications, displacement modes of the FEM, general variational principle and hybrid finite elements, geometrical non-linear FEM, physical non-linear FEM and numerical simulations of crack propagation.	
Teaching and learning methods	4 SWS lectures, 2 SWS exercises, self studies.	
Prerequisites	Prerequisites are knowledge in the field of algebra, analysis, numerical-mathematical approaches as well as the modelling in the field of solid mechanics on the level of a bachelor study.	
Applicability	The module is mandatory within the Master Program Advanced Computational and Civil Engineering Structural Studies (ACCESS). The module provides the preliminaries of the module Form finding of lightweight structures, Timber and lightweight structures, Computational Dynamics as well as the module Building Information Modeling: Methods and Concepts	
Requirements for earning credit points	Credit points are earned if the examination of the module is successfully passed. The examination is an exam with a duration of 120 minutes and an ungraded portfolio with a scope of 40 hours. The language of the exam is English.	
Credit points and grades	Eight (8) credit points are achievable by this module. The grade of the module is determined under consideration of §15 paragraph 1 sentence 5 and 6 of the examination regulations by the weighted average of the grades of the exam and the portfolio. The exam is weighted doubled and the portfolio is weighted single.	
Module frequency	The module is taught every winter term.	
Workload	The workload is 240 hours in total.	
Module duration	The module duration is one semester.	
Recommended reading list	Chandrupatla, Belegundu: Introduction to Finite Elements in Engineering, Prentice-Hall; Zienkiewicz, Taylor: The Finite Element Method, Butterworth-Heinemann.	