Module name	**Finite element methods – Theory, implementation and applications**
Module number	CMS-TRK-MA31
Senior Lecturer	Director of the Institute of Scientific Computing id.wir@tu-dresden.de
Qualification objectives	Students have a systematic understanding of the Finite Elements Method (FEM) theory, in particular convergence outcomes. They have knowledge of algorithmic issues and implementation aspects in finite element software and basic knowledge and experience in modelling application-related problems, for example in areas of flow mechanics and material sciences. Students are able to analyse specific issues from the application areas covered independently and to solve them using appropriate FEM procedures.
Contents	The content of the module is the theory and practice of the Finite Elements method, in particular variation formulation, discretisation, convergence, numerical implementation and application.
Forms of teaching and learning	The module includes lectures of 3 SWS, exercises of 1 SWS and self-study. The teaching language of lectures and exercises may be German or English and will be specifically determined by the teacher at the beginning of each semester and announced in the usual manner.
Eligibility for participation	Skills in the numeric nature of ordinary differential equations at bachelor's level are required. The following literature is suitable for preparation: Numerical mathematics. Hans-Jörg Roos, Hubert Schwetlick. Vieweg+Teubner, 1999.
Usability	In the Masters Course Computational Modeling and Simulation, the module is a compulsory module in track computational mathematics and in track computational engineering. In the Masters Course Computational Modeling and Simulation, the module is an optional module in the Track Computational Modeling in Energy Economics, to be selected in accordance with Annex 2 to the Specific Test Rules. The module cannot be chosen in the Master's Course Computational Modeling and Simulation if this or a module with substantially the same content from a Course with which the entry conditions under § 3 of the Studienordnung have been met has already been completed. The module provides the pre-requisites for the modules it designates under the pre-requisites for participation.
Conditions for the award of credits	Credits are awarded when the module test is passed. The module test consists of a 120-minute away day. The language of the test will be English.

Credits and marks	The module allows 5 credit points to be obtained. The module score corresponds to the test performance score.
Frequency of the module	The module is offered every winter semester.
Workload	The total workload is 150 hours.
Duration of the module	The module covers 1 semester.