Module name	**Electromechanical and Microelectromechanical systems**
Module number	CMS-TRK-EMS
Senior Lecturer	Prof. Dr.-Ing. habil. Uwe Marschner uwe.marschner@tu-dresden.de
Qualification objectives	Students have basic methodological and practical knowledge of the effective design and illustrative analysis of the dynamic behaviour of electromechanical, micro-electromechanical and electromagnetic systems, as well as of the function and modelling of reversible electromechanical transducers in sensors and actuators. They are familiar with the determination of parameters using finite element methods and master the methodology of combining methods using virtual cutting devices. Students are able to apply the clear and illustrative analytical procedures of electrical networks, to develop a better physical understanding, to design physically different subsystems in a closed way and to simulate with existing design software such as SPICE.
Contents	The content of the module is the description of interconnected multi-physical subsystems in the form of a common circuit diagram and their behaviour simulation. Other content includes simple mechanical, magnetic, fluid, acoustic, electrical and coupled systems, including their interactions, as well as solving complex problems of design-by-design optimisation of the dynamic behaviour of electromechanical systems by combining the network simulation of electromechanical systems with the finite element modelling process and finite element and LTSPICE simulation tools.
Forms of teaching and learning	The module includes lectures of 2 SWS, exercises of 2 SWS and self-study. The language of the lectures and exercises will be English.
Eligibility for participation	Basic knowledge of mathematics (complex numeracy), electrical engineering and physics (technical mechanics, magnetics, pneumatics, hydraulics) at bachelor's level is required.

Usability	In the Masters Course Computational Modeling and Simulation, the module is an optional module in track computational engineering, to be selected in accordance with Annex 2 to the Specific Examination Regulations. 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 an away day of 120 minutes' duration and a portfolio of 12 hours. Both audit services are relevant to success. The language of the test will be English.
Credits and marks	The module allows 5 credit points to be obtained. The module score is the weighted average of the scores for each audit work. Time off work is multiplied by five and the portfolio is simply weighted.
Frequency of the module	The module is offered every summer semester.
Workload	The total workload is 150 hours.
Duration of the module	The module covers 1 semester.