

Module Name	Modeling and Simulation
Module Number	Eul-MT-E-MoSiM
Responsible Lecturer	Prof. Dr. techn. Klaus Janschek klaus.janschek@tu-dresden.de
Qualification Objectives	After completing the module, students master multiphysical modeling paradigms for models with lumped parameters and can independently create mathematical models in the notation of ordinary differential equation systems (ODE) and differential-algebraic equation systems (DAE). They are proficient in the basic structure of numerical integration algorithms for ODE and DAE models and understand specific properties of their application to technical physical systems.
Contents	The module covers: - Elements of physical modeling for electromechanical systems based on energy-based modeling paradigms such as Euler-Lagrange, torque-based modeling paradigms such as generalized Kirchhoff networks, and signal-based modeling paradigms. - Elements of simulation techniques, numerical integration of ordinary differential equation systems, differential-algebraic equation systems (DAE), and hybrid systems (i.e., event-discrete-continuous equation systems), as well as signal-/object-oriented modular simulation.
Teaching and Learning Forms	3 hours per week of lectures, 2 hours per week of exercises, 1 hour per week of practical lab courses, and self-study.
Prerequisites for Participation	The competencies to be acquired in the module Automation Engineering are required.
Usability	The module is an elective module from the elective area "Methods and Applications" according to § 6 paragraph 3 SO and § 33 paragraph 3 PO of the main study program in the diploma program Mechatronics. It creates the prerequisites for the modules that list this module in the field "Prerequisites for Participation."
Prerequisites for the Award of Credit Points	Credit points are awarded when the module examination is passed. The module examination consists of a written exam lasting 180 minutes and a complex assignment with a workload of 40 hours.
Credit Points and Grades	7 credit points can be earned through the module. The module grade is determined by the weighted average of the grades of the examination components. The written exam is weighted threefold, and the complex assignment is weighted singly.
Frequency of the Module	The module is offered every winter semester.
Workload	The total workload is 210 hours.
Duration of the Module	The module lasts one semester.