

Module Name	Numerical Methods
Module Number	Eul-MT-E-NUM, Eul-RES-E-NUM
Responsible Lecturer	Prof. Markus Kästner markus.kaestner@tu-dresden.de
Qualification Objectives	After completing the module, students master the approximate solution of boundary value problems as well as coupled initial-boundary value problems based on the mathematical methods of weighted residuals, weak formulations, and inverse formulations. They are familiar with the necessary algorithms for algebraization and discretization, including the associated numerical methods, and possess practical skills in applying modern programming languages and FEM software to capture or simulate the behavior of mechanical structures under static and dynamic loads.
Contents	The module covers established simulation methods for the approximate solution of boundary value problems, fundamentals of algebraization, discretization, and the numerical properties of the methods, the finite element method, and the boundary element method using structural-mechanical problem scenarios.
Teaching and Learning Forms	2 hours per week of lectures, 2 hours per week of exercises, 1 hour per week of practical sessions, and self-study.
Prerequisites for Participation	The competencies to be acquired in the modules Introduction to Analysis and Algebra, Multidimensional Differential and Integral Calculus, Function Theory, Partial Differential Equations and Probability Theory, Physics, Materials, Engineering Mechanics, and Basics of Electrical Engineering are required.
Usability	The module is one of two elective modules in the elective area "Mechatronics Fundamentals" in the diploma program Mechatronics, of which one must be chosen. It is also an elective module in the elective area "Orientation" according to § 6 Paragraph 3 SO and § 33 Paragraph 3 PO in the main study phase of the diploma program Regenerative Energy Systems. 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 120 minutes.
Credit Points and Grades	5 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the Module	The module is offered every winter semester.
Workload	The total workload is 150 hours.
Duration of the Module	The module lasts one semester.