

Module Name	Nonlinear Control Engineering Basics
Module Number	Eul-MT-E-NLRB, Eul-IST-E-NLRB
Responsible Lecturer	Prof. Dr.-Ing. habil. Klaus Röbenack klaus.roebenack@tu-dresden.de
Qualification Objectives	After completing the module, students are able to: - Analyze fundamental dynamic properties of selected classes of nonlinear systems, - Understand the stability concept according to Lyapunov for nonlinear systems and verify the stability of equilibrium points of nonlinear systems, - Design controllers and control systems for selected classes of single-input nonlinear systems.
Contents	The module covers: - Analysis of nonlinear systems, for example, in the state space and using the harmonic balance method, - Direct and indirect Lyapunov methods, - Methods for designing nonlinear controllers for specific classes of single-input nonlinear systems, such as sliding mode controllers or controllers designed using exact input-output linearization.
Teaching and Learning Forms	2 hours per week of lectures, 1 hour per week of exercises, 1 hour per week of practical lab courses, and self-study.
Prerequisites for Participation	The competencies acquired in the module "Control Engineering Basics" are required.
Usability	The module is an elective module in the elective area "Competence Deepening" according to § 6 paragraph 3 SO and § 33 paragraph 3 PO of the main study program in the field of Automation, Sensor Technology, and Robotics in the diploma program Information Systems Engineering. Furthermore, it is an elective module in 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 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 and a portfolio with a workload of 20 hours. Both examination components are relevant for passing.
Credit Points and Grades	5 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 portfolio is weighted singly.
Frequency of the Module	The module is offered every summer semester.
Workload	The total workload is 150 hours.
Duration of the Module	The module lasts one semester.