

Module Name	Control Engineering
Module Number	Eul-RES-C-RegT
Responsible Lecturer	Prof. Stefan Odenbach studiendokumente.mw@tu-dresden.de
Qualification Objectives	Based on their knowledge of measurement principles, methods, and procedures, students are able to design, set up, evaluate, and apply suitable measurement setups for the physical quantities and process parameters relevant to mechanical engineering, such as pressure, force, flow, displacement, motion, and sound, using appropriate intermediate circuits. Students understand how to represent the dynamic processes of engineering sciences through idealized signal transmission elements as a function of time and frequency. They are capable of linking transmission elements in series, parallel, and circular connections as a foundation for the interaction of continuous controllers and control loops. Students are familiar with the function and structure of control processes, the stability of control loops, control loop extensions, process control and automation systems, as well as discontinuous controllers. They are able to determine and evaluate the static and dynamic behavior of signal transmission elements and measurement systems from all areas of mechanical engineering in interaction with typical mechanical engineering model arrangements.
Contents	The module covers the fundamentals of control and automation engineering. This includes the measurement of non-electrical quantities, sensor technology, and the description of the dynamic behavior of all systems relevant to mechanical engineering using linear system theory in both the time and frequency domains. The analysis of dynamic systems focuses on systems whose dynamics can be described in the time domain using second-order differential equations. Additionally, the module includes the fundamentals of control engineering, the description of continuous and discontinuous controllers, the determination of control loop stability, and the basics of developing control and automation systems. The necessary foundational knowledge of Boolean algebra is also provided.
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	Competencies acquired in the modules Basics of Electrical Engineering, Introduction to Analysis and Algebra, Multidimensional Differential and Integral Calculus, Physics, and Measurement Technology are required.
Usability	The module is a compulsory module in the diploma program Renewable Energy Systems. It creates the prerequisites for the modules that list this module under "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 portfolio with a workload of 75 hours. A bonus performance for the portfolio is a progress assessment with a workload of 15 hours.
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 summer semester.
Workload	The total workload is 150 hours.
Duration of the Module	The module lasts one semester.