

Module Name	Electric Drive Technology Basics
Module Number	Eul-MT-E-M05G
Responsible Lecturer	Prof. Dr.-Ing. Matthias Centner matthias.centner@tu-dresden.de
Qualification Objectives	After completing the module, students are able to understand the operating behavior of electrical drives using equivalent circuit diagrams and assess the control and regulation properties through appropriate calculations, measurements, and tests. Students master the internal processes in power-electronic actuators, can model and calculate them, and understand their interaction with the electrical drive and drive-related control systems.
Contents	The module covers the following topics: - Fundamentals and dimensioning of electrical drives, including electromechanical energy conversion, heating and motion processes, working machines, motion converters, and motor selection for stationary and dynamic operation. - Speed and torque control of drives, including converter-fed DC drives, speed, voltage, and frequency control of three-phase asynchronous drives, three-phase synchronous drives, servo and stepper drives. - Control of drives, including controlled DC and three-phase drives, vehicle drives, machine tool drives, and mechatronic systems. - Structure and functionality of actively switchable power semiconductor components. - Analysis of the functionality of self-commutated circuits. - Simplification of the systems under consideration for simulation purposes. - Design of the core components of the power-electronic subsystem. - Modulation methods for controlling power-electronic actuators and control and regulation methods.
Teaching and Learning Forms	4 hours per week of lectures, 2 hours per week of exercises, and self-study.
Prerequisites for Participation	The competencies to be acquired in the modules Electrical Power Engineering, Electrical and Fluid Drive Systems, Power Electronics Basics, Automation Engineering, and Measurement Technology 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.
Credit Points and Grades	7 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 210 hours.
Duration of the Module	The module lasts one semester.