Module Name	Analogue and Digital Circuit Design
Module Number	EuI-ET-C-ADST
Responsible Lecturer	Prof. Dr.-Ing. habil. Christian Georg Mayr christian.mayr@tu-dresden.de
Qualification Objectives	After completing the module, students have advanced knowledge of the functionality and design principles of analogue and digital circuits. They possess knowledge of semiconductor devices – particularly transistors – and master the analysis and design of analogue, mixed-signal, and digital circuits. They are familiar with architectural and system concepts of complex digital systems. Students are acquainted with current concepts and issues in the field of circuit design, including specific challenges in nanoscale CMOS technologies, methods for reducing power dissipation, measures to increase processing speed, and the consideration of statistical influences from manufacturing technologies.
Contents	The module covers the analysis, dimensioning, and optimization of analogue and digital circuits. It also includes examples of chip implementations based on current semiconductor technologies such as CMOS and BiCMOS. **Contents related to analogue circuits** include amplifier concepts, such as bandwidth enhancement considering the Miller effect; multistage amplifiers, e.g., cascode amplifiers; power amplifiers, e.g., for audio and communication technology; current sources; current mirrors; and circuits for DC power supply. **Contents related to digital circuits** include the design of complex logic functions in the form of arithmetic-logic circuits, e.g., ALUs, shifters, and multipliers; state machines such as finite state machines; and flip-flop and oscillator circuits. Additional topics include digital architecture and system concepts such as register-transfer logic; memory architectures such as DRAM, SRAM, and EPROM; mixed-signal circuits such as ADCs, DACs, and interfaces; and the methodology for designing complex digital and mixed-signal systems.
Teaching and Learning Forms	3 hours per week of lectures, 2 hours per week of exercises, and self-study.
Prerequisites for Participation	The competencies to be acquired in the module Circuit Design are required.
Usability	The module is a compulsory module of the main study program in the field of Electronic Systems, Micro and Medical Technology in the diploma program Electrical Engineering. 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 150 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.