

Module Name	Integrated Circuit Design for Biomedical Sensors
Module Number	Eul-IST-E-ICDBS, Eul-NES-E-ICDBS
Responsible Lecturer	Prof. Dr.-Ing. Andreas Bahr andreas.bahr@tu-dresden.de
Qualification Objectives	After completing the module, students will have an in-depth understanding of the design of analog integrated circuits and their design techniques. They are familiar with the essential methods for designing, simulating, and laying out analog integrated circuits, as well as with the use of professional design tools such as Cadence IC Design. Students are able to simulate the electrical functionality of an integrated circuit. Furthermore, they know how to account for significant parasitic effects during the simulation and design process. They can apply this knowledge to the design of biomedical sensors and their electronic interfaces, as well as to the improvement of existing circuits. They are capable of analyzing complex integrated circuits and applying strategies for the efficient realization of complex integrated circuits.
Contents	The module covers concepts and methods for designing analog integrated circuits for biomedical sensors and electronic sensor interfaces. The focus is on low-frequency, energy-efficient, and low-noise circuits: - Analog integrated circuits - Amplifier circuits, i.e., low-noise, low-power design - Electronic interface circuits - Biomedical signal generation and transmission - Analog design process - Circuit design methods, e.g., gm/I_D - Simulation of electrical functionality - Chip engineering (floorplan, placement, routing, physical layout) - Selected implementations of biomedical electronic interface circuits and electrically active medical implants
Teaching and Learning Forms	2 hours per week of lectures, 2 hours per week of practical lab courses, and self-study. The language of instruction for lectures and practical lab courses is English.
Prerequisites for Participation	In the diploma program Information Systems Engineering, the competencies acquired in the module Circuit Design are required. In the master's program Nanoelectronic Systems, basic knowledge of circuit design at the bachelor's level is required.
Usability	The module is an elective module in the field of Electronic Circuits and Systems in the diploma program Information Systems Engineering. Furthermore, it is an elective module in the master's program Nanoelectronic 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 90 minutes and a portfolio with a workload of 80 hours. Both examination components are required to pass.
Credit Points and Grades	7 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 210 hours.
Duration of the Module	The module lasts one semester.