

Department	06 Applied Sciences and Mechatronics
Course title	Design of Integrated Circuits
Hours per week (SWS)	4
Number of ECTS credits	6
Course objective	<p>After completing this module successfully, students have gained the following competencies:</p> <ul style="list-style-type: none"> - They have a deepened understanding of selected topics of modern highly integrated semiconductor technologies - They know tools for the design of integrated circuits and can develop and simulate integrated circuits with multiple hierarchy levels - They understand the basics of integrated circuit design and can design and simulate optimized integrated digital circuits - They understand the circuit technology of analog components in CMOS-technology and can design, simulate, and optimize integrated circuits.
Prerequisites	Basics of semiconductor physics
Recommended reading	<ol style="list-style-type: none"> 1. Baker, Li, Boyce, CMOS Circuit Design, Layout, and Simulation, IEEE Press, 2010. 2. B. Razavi, Design of Analog CMOS Integrated Circuits.
Teaching methods	Lectures and hands on training
Assessment methods	100% written examination: 90'
Language of instruction	English
Name of lecturer	Prof. Dr. Helmut Fischer, Prof. Dr. Ullrich Menczigar
Email	helmut.fischer@hm.edu; ullrich.menczigar@hm.edu
Link	https://t1p.de/i4zpu
Course content	<p>Full custom versus semicustom design. The MOSFET (a refresher), the FINFET. Leakage mechanisms and low power design. Basics of full custom digital design. Design for manufacturing: 6 Sigma design and verification strategies. Mask generation: Lithography and OPC (Optical Proximity Correction). Device reliability and integrated circuits durability. Special analog and digital functional blocks. Single stage amplifier (common source circuit, source follower) Differential amplifier (with passive resp. with active load) Frequency behavior of amplifiers (single stage amplifier and differential amplifier) Single stage and dual stage operational amplifiers Hands on training: Design and layout of a dual stage operational amplifier (Miller-OTA) - Matching constraints in design and layout of operational amplifiers - Layout rules - Extraction of layout parasitics - Simulation including layout parasitics</p>
Remarks	