

Specification for the book of courses

Study program		Electronics and Microsystems		
Module		Electronics and Microsystems		
Type and level of studies		Master studies		
The name of the course		Mixed Signal Integrated Circuit Design		
Lecturer (for lectures)		Petković M. Predrag, Andrejević-Stošović V. Miona		
Lecturer/associate (for exercises)		Mirković D. Dejan		
Lecturer/associate (for OFE)		Mirković D. Dejan		
Number of ECTS	5	Course status (obligatory/elective)	Elective	
Prerequisites				
Course objectives				
Adopting and systematizing knowledge related to electronic circuits with digital and analog signals with particular emphasis on the parts in which conversion from one signal to another occurs.				
Course outcomes				
Acquiring competencies for designing integrated circuits with mixed signals. Students are expected to learn to use HDL-AMS, to dimension transistors in analog and digital parts of mixed-signal circuits, use software tools for verification and physical design of integrated circuits as well as to learn how to write and present the result of the work.				
Course outline				
Theoretical teaching				
Basics of the HDL-AMS language for the description of hardware. A/D and D/A converter models. Converters performances. Effective number of bits. Improving the signal/noise ratio using feedback. Noise shaping. Improving the signal/noise ratio by averaging. A signal sampling. SC-circuits. SI-circuits. Programmable Gain Amplifiers (PGA). Architecture and design of A/D converters. SD modulator. MASH architecture. Decimator filters for A/D converters. Architecture and designing D/A converters. Effects of signal crosstalk. Clock signals. Thermal effects. Effects of the substrate. Impact of tolerances and matching. Application of integrated A/D and D/A converters.				
Practical teaching (exercises, OFE, study and research)				
Acquired knowledge in lectures is deepened through a set of hands-on sessions with professional CAD/EDA tools for mixed-signal IC design (Cadence, Mentor Graphics).				
Textbooks/references				
1	Dokić B., Petković P., Analysis and design of CMOS digital integrated circuits (in Serbian), Academic Mind, Belgrade, 2017, ISBN 978-86-7466-696-8			
2	Barr K., ASIC Design in the Silicon Sandbox: A Complete Guide to Building Mixed-Signal Integrated Circuits 1st Edition, McGraw-Hill Education; 1 edition (December 22, 2006) ISBN-10: 0071481613.			
3	Baker J. R., CMOS: Mixed-Signal Circuit Design, Second Edition 2nd Edition, Wiley-IEEE Press; (December 10, 2008), ISBN-10: 0470290269			
4				
5				
Number of classes of active education per week during semester/trimester/year				
Lectures	Exercises	OFE	Study and research work	Other classes
2	1	2		
Teaching methods				
Lectures; Auditory exercises; Laboratory exercises on computer; Consultations; Individual and group projects.				
Grade (maximum number of points 100)				
Pre-exam duties		Points	Final exam	Points
Activity during lectures		10	Written exam	
Exercises		20	Oral exam	30
Colloquia				
Projects		40		