



Subject card

Subject name and code		Engineering of Integrated Circuits and Systems, PG_00048077						
Field of study		Electronics and Telecommunications						
Date of commencement of studies		October 2022	Academic year of realisation of subject			2024/2025		
Education level		first-cycle studies	Subject group			Optional subject group Subject group related to scientific research in the field of study		
Mode of study		Full-time studies	Mode of delivery			at the university		
Year of study		3	Language of instruction			Polish		
Semester of study		5	ECTS credits			4.0		
Learning profile		general academic profile	Assessment form			assessment		
Conducting unit		Department of Microelectronic Systems -> Faculty of Electronics, Telecommunications and Informatics						
Name and surname of lecturer (lecturers)		Subject supervisor		dr hab. inż. Bogdan Pankiewicz				
		Teachers		dr hab. inż. Waldemar Jendernalik dr hab. inż. Bogdan Pankiewicz				
Lesson types and methods of instruction		Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
		Number of study hours	15.0	0.0	15.0	15.0	0.0	45
		E-learning hours included: 0.0						
Learning activity and number of study hours		Learning activity	Participation in didactic classes included in study plan	Participation in consultation hours		Self-study	SUM	
		Number of study hours	45	4.0		51.0	100	
Subject objectives		Main aim of the subject is introduction to design of integrated circuits and systems.						
Learning outcomes		Course outcome		Subject outcome		Method of verification		
		[K6_W32] Knows the parameters, functions and methods of analysis, design and optimization of analogue and digital circuits and electronic systems		knows the basic principles of designing analog and digital integrated circuits, knows the limitations resulting from the technology used, is able to estimate the speed of work as well as the consumed power of the digital circuit in the core and on external terminals		[SW1] Assessment of factual knowledge		
		[K6_U05] can plan and conduct experiments related to the field of study, including computer simulations and measurements; interpret obtained results and draw conclusions		can design integrated circuit, can make electrical simulation and choose correct technology, can design electrical schematic and layout, can estimate speed and power consumption		[SU5] Assessment of ability to present the results of task [SU3] Assessment of ability to use knowledge gained from the subject [SU1] Assessment of task fulfilment		
		[K6_W03] knows and understands, to an advanced extent, the construction and operating principles of components and systems related to the field of study, including theories, methods and complex relationships between them and selected specific issues - appropriate for the curriculum		knows the syntax of PSPICE files, types of possible simulations, ways of describing analog and digital circuits, and methods of simulating electronic circuits		[SW1] Assessment of factual knowledge		
Subject contents		1. IC technologies, technological processing steps, process scenario. 2. Design rules. 3. Passive and active components in integrated circuits. 4. IC cost of design, prototyping and volume production. 5. IC defects and process yield. 6. Technology window of the process. 7. Relative and absolute device mismatches. 8. Methods of matching devices in IC technology. 9. Parasitic phenomenon. 10. AnalAnalog I/O circuits. 11. Digital I/O circuits. 12. Noise coupling, noise margin. 13. Power dissipation and temperature considerations. 14. Circuit extraction. 15. PSPICE circuits simulations.						

Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	lecture	51.0%	50.0%
	project	51.0%	25.0%
	labs	51.0%	25.0%
Recommended reading	Basic literature	R. L. Geiger, P. E. Allen, N. R. Strader, VLSI design techniques for analog and digital circuits, McGraw-Hill 1990. Matching properties of MOS transistors, M. Pelgrom, A. Duinmaijer, A. Welbres, IEEE Journal of Solid-State Circuits, vol. 24, no. 5, October 1989 J. Izydorczyk, PSpice komputerowa symulacja układów elektronicznych, Helion, 1993 C. Wai-Kai (editor), The VLSI Handbook, Taylor & Francis Group, 2007	
	Supplementary literature	No requirements	
	eResources addresses	Adresy na platformie eNauczanie: Inżynieria układów i systemów scalonych - 2024/25 - Moodle ID: 39567 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=39567	
Example issues/ example questions/ tasks being completed			
Work placement	Not applicable		

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