

。 GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Basics of Microelectronic Systems, PG_00038895								
Field of study	Space and Satellite Technologies								
Date of commencement of studies	February 2024		Academic year of realisation of subject		2024/2025				
Education level	second-cycle studies		Subject group						
Mode of study	Full-time studies		Mode of delivery			at the university			
Year of study	1		Language of instruction			Polish			
Semester of study	2		ECTS credits			3.0			
Learning profile	general academic profile		Assessment form			assessment			
Conducting unit	Department of Microelectronic Systems -> Faculty of Electronics, Telecommunications and Informatics						rmatics		
Name and surname	Subject supervisor		dr hab. inż. Waldemar Jendernalik						
of lecturer (lecturers)	Teachers		dr hab. inż. Waldemar Jendernalik						
Lesson types and methods	Lesson type	Lecture	Tutorial	Laboratory Project		t	Seminar	SUM	
of instruction	Number of study hours	15.0	0.0	15.0 15.0			0.0	45	
	E-learning hours inclu	ided: 0.0				1			
Learning activity and number of study hours	Learning activity	earning activity Participation ir classes includ plan		Participation in consultation hours		Self-study SUM		SUM	
	Number of study hours	lumber of study 45 ours		0.0		0.0		45	
Subject objectives	The aim of the course is to familiarize student with the basic knowledge and skills in the field of microelectronic systems design in CMOS technology using a non-standard method (ie. full-custom method) and in the technology of programmable FPGAs.								
Learning outcomes	Course outcome		Subject outcome				Method of verification		
	K7_W12		Student knows the basic methods and techniques of designing complex electronic systems in large scale integration technologies.			[SW1] Assessment of factual knowledge			
	[K7_K03] Can analyse and implement assigned tasks while maintaining high technical standards. Is able to work and interact in a group, taking on different roles. Adheres to the principles of professional ethics and respects the diversity of views and cultures.		Student can implement assigned tasks from the area covered by this course taking into account technical aspects as well as economic, cultural, ethical and legal conditions.			[SK5] Assessment of ability to solve problems that arise in practice			
	K7_W07		Student knows methods of fabricating microelectronic circuits (integrated circuits) and their applications. He knows the application and construction of FPGA programmable systems. He knows computer tools for simulation of electronic circuits.			[SW1] Assessment of factual knowledge			
	K7_U08		Student designs microelectronic systems: performs computer simulation of their behavior using circuit simulators, designs the layout of an integrated circuit. Student designs digital circuits based on HDL description: simulates the behavior of circuits in HDL simulators, implements and tests the design in a real FPGA system.			[SU4] Assessment of ability to use methods and tools [SU1] Assessment of task fulfilment			

Subject contents	LECTURE. Microelectronic circuits, their definition and history. Fabrication technology of microelectronic circuits, its limitations and cost. Field effect and a field effect transistor from the inventor's point of view. Implementation of basic logic functions in "silicon". Information processing in the analog and digital domains - limitations, advantages and disadvantages. Combination and sequential digital circuits, their definition, synthesis and examples. Computer tools (CAD) to support the design of microelectronic systems at the "silicon" level (circuit simulators, silicon microstructure layout editors), their capabilities and cost. Hardware description languages (HDL) - basic syntax course, examples. LABORATORY. Examination of a simple digital circuit: - computer simulations of an electrical diagram, - layout design of an integrated circuit, - extraction of layout parasitics and verification (ie. post-layout) simulations. PROJECT. Design of a simple digital circuit in FPGA: - a project based on an electrical diagram.						
Prerequisites and co-requisites	 project based on HDL description. Knowledge of the basics of electrical circuits. Knowledge of mathematical analysis in the basic scope. 						
Assessment methods	Subject passing criteria	Passing threshold	Percentage of the final grade				
and criteria	practical exercises	50.0%	70.0%				
	- quiz	50.0%	30.0%				
Recommended reading	Basic literature	 P.E. Allen, D.R. Holberg "CMOS Analog Circuits Design," Oxford University Press, USA 2002. B. Pankiewicz, W. Jendernalik "Projektowanie full-custom układów scalonych CMOS w środowisku Cadence Virtuoso," skrypt, Wydawnictwo Politechniki Gdańskiej, 2016. B. Pankiewicz, M. Wójcikowski, "Języki modelowani i symulacji", skrypt, Wydawnictwo Politechniki Gdańskiej, Gdańsk 2015. 					
	Supplementary literature	Marek Zwoliński, "Projektowanie układów cyfrowych z wykorzystaniem języka VHDL", Wydawnictwa Komunikacji i Łączności WKŁ, Warszawa 2007.					
	eResources addresses	Adresy na platformie eNauczanie: Podstawy układów mikroelektronicznych 2024/2025 - Moodle ID: 30779 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=30779					
Example issues/ example questions/ tasks being completed							
Work placement	Not applicable						

Document generated electronically. Does not require a seal or signature.