GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Basics of Digital Techniques, PG_00038091
Field of study	Automation, Robotics and Control Systems

Date of commencement of studies	October 2022	Academic year of realisation of subject	2023/2024
Education level	first-cycle studies	Subject group	
Mode of study	Full-time studies	Mode of delivery	at the university
Year of study	2	Language of instruction	Polish
Semester of study	3	ECTS credits	5.0
Learning profile	general academic profile	Assessment form	exam

Conducting unit	Department of Control Engineering -> Faculty of Electrical and Control Engineering

Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Andrzej Kopczyński
	Teachers	dr inż. Andrzej Kopczyński

Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	15.0	0.0	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	7.0	73.0	125

Subject objectives	Knowledge of number systems, binary cods, logic functions and elements. Acquire skills of synthesis of combination and simple sequential synchronous circuits.

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K6_K02] can work in a group taking on different roles in it	A team of students assembles the system and connects power supply and measuring devices. Measurements are carried out as a team - setting parameters, operating the meter and recording the results.	[SK5] Assessment of ability to solve problems that arise in practice [SK1] Assessment of group work skills
	[K6_U01] can obtain information from literature, databases and other sources; integrate the information obtained, interpret it and draw conclusions, formulate and justify opinions	The student is able to use the literature on the topic.	[SU2] Assessment of ability to analyse information
	[K6_W01] has basic knowledge in the field of mathematics including algebra, geometry, mathematical analysis, probabilistics, numerical methods - necessary to describe and analyze automation and robotics systems	Based on a schematic diagram, the student is able to describe the operation and design simple digital automation systems.	[SW3] Assessment of knowledge contained in written work and projects

Subject contents	**Lecture:** Number systems and cods. Arytmethics of binary numbers. Boolean algebra. Boolean functions and their representation. Minimisation of Boolean functions. Classification of digital circuits and their mathematical description. Elements of switching circuits: contact, liquid, semiconductors, logical gates. Classical combination circuits synthesis. Multiplexers, demultiplexers summing circuits and memories, their application at combination circuits synthesis. Encoders, decoders and transcoders - transformation of digital information representation. Flip-flops, registers and counters. Generators and time dependent circuits. Synchronous and asynchronous sequential circuits synthesis bases. Description of Mealy and Moore digital automata - tables of state transitions and outputs, graphs. Synchronous sequential circuits synthesis using D Flip flops. Design of switching circuits using blocks and functional units. Simple micro-programmable circuits. **Laboratory:** Investigation of gates and Flip flop parameters. Counters, decoders and multiplexers. Combination circuits design using logical gates. Combination circuits design using multiplexers. Design and realisation of synchronous sequential circuits. Design of simple micro-programmable circuits.

Prerequisites and co-requisites	Knowledge of an electronic and measure bases.		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Written exam	60.0%	60.0%
	Practical exercise	60.0%	40.0%

Recommended reading	Basic literature	1. Skorupski A.: Podstawy techniki cyfrowej, WKŁ, Warszawa, 2001. 2. Pieńkoś J., Turczyński J: Układy scalone TTL w systemach cyfrowych, WKŁ, Warszawa, 1986. 3. Kalisz J.: Cyfrowe układy scalone w technice systemowej, WMON, Warszawa, 1977. 4. Tyszner J., Mrugalski G., Pogiel A., Czysz D.: Technika cyfrowa - Zbiór zadań z rozwiązaniami, WBTC, Legionowo, 2016.
	Supplementary literature	1. Saal W.: Układy scalone serii UCA64/UCY74, parametry i zastosowania, WKŁ, Warszawa 1990.
	eResources addresses	Adresy na platformie eNauczanie: PODSTAWY TECHNIKI CYFROWEJ [2023/24] - Moodle ID: 32122 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=32122
Example issues/ example questions/ tasks being completed	Methods of kombinational circuits description. What kind of methods of Boolean function minimalization do you know? Desctibe Mealy automata.
Work placement	Not applicable