GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Digital Circuits, PG_00058916		
Field of study	Informatics		
Date of commencement of studies	October 2022	Academic year of realisation of subject	2023/2024
Education level	first-cycle studies	Subject group	Obligatory subject group in the field of study Subject group related to scientific research in the field of study
Mode of study	Part-time studies	Mode of delivery	at the university
Year of study	2	Language of instruction	Polish
Semester of study	3	ECTS credits	4.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Department of Automatic Control -> Faculty of Electronics, Telecommunications and Informatics		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Kamil Stawiarski	
	Teachers	dr inż. Kamil Stawiarski dr inż. Stefan Sieklicki	

Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	15.0	0.0	0.0	30
	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	30	11.0	59.0	100

Subject objectives	1. Aims of the course (effects of the course): Skills of digital and microprocessor system description, analysis and designing . 2. Description of CCs: logic functions and truth tables, description of SCs: state transition tables and diagrams for Moore and Mealy models. Examples of CCs and SCs circuits.Positional number systems: decimal, binary, octal, hexadecimal. 3. SOP, POS and canonical forms of logic functions 4. Simplification of logic functions using Karnaugh tables and, Quine-McCluskey methode . 5. CC design with logic gates AND, OR, NOT,NAND and NOR.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_W04] Knows and understands, to an advanced extent, the principles, methods and techniques of programming and the principles of computer software development or programming devices or controllers using microprocessors or programmable elements or systems specific to the field of study, and organisation of systems using computers or such devices	Knows and understands at an advanced level the principles, methods and techniques of designing digital circuits, both based on logic gates and more complex components. Understands the function of the designed device in the context of a digital machine.	[SW1] Assessment of factual knowledge [SW3] Assessment of knowledge contained in written work and projects
[K6_W06] Knows and understands the basic processes occurring in the life cycle of devices, facilities and systems specific to a given field of study.	Knows and understands to an advanced level the structure and principles of operation of systems based on logic gates, in particular combinational and sequential synchronous systems.	[SW3] Assessment of knowledge contained in written work and projects
[K6_U03] can design, according to required specifications, and make a simple device, facility, system or carry out a process, specific to the field of study, using suitable methods, techniques, tools and materials, following engineering standards and norms, applying technologies specific to the field of study and experience gained in the professional engineering environment	Is able to design, construct and launch a system that performs the desired function, in accordance with a given specification.	[SU1] Assessment of task fulfilment
[K6_U41] can produce, test or evaluate software using modern programming platforms, tools, languages and paradigms of different levels, as well as use software packages supporting scientific and research processes as well as business decision-making processes and teamwork	Is able to construct, test and verify the correctness of given systems based on data from catalog notes and own knowledge of the operation of digital integrated circuits, in particular the TTL family.	[SU1] Assessment of task fulfilment [SU2] Assessment of ability to analyse information
[K6_W02] Knows and understands, to an advanced extent, selected laws of physics and physical phenomena as well as methods and theories explaining the complex relationships between them, constituting the basic general knowledge in the field of technical sciences related to the field of study	Knows and understands to an advanced level the structure and principles of operation of components that make up digital machines, in particular TTL and CMOS series systems.	[SW1] Assessment of factual knowledge

Subject contents

1. Aims of the course (effects of the course): Skills of digital and microprocessor system description, analysis and designing with use of IC catalogues and application notes. 2. Description of CCs: logic functions and truth tables, description of SCs: state transition tables and diagrams for Moore and Mealy models. Examples of CCs and SCs circuits.Positional number systems: decimal, binary, octal, hexadecimal. 3. Signed number representation BIN, HEX, BCD, U1, U2, and binary arithmetic, floating-point notation. 4. SOP, POS and canonical forms of logic functions forms, other Algebras examples, exemplary uses of Boo-lean Algebra connecting networks 5. Simplification of logic functions using Karnaugh tables and, Quine-McCluskey methode . 6. CC design with logic gates AND, OR, NOT,NAND and NOR. Some remarks on simplification of SOP and POS forms contrary global simplification, transition times.

Prerequisites and co-requisites

No requirements

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Colloquium on practical tasks	50.0%	34.0%
Colloquium in the theoretical part	50.0%	33.0%
Laboratory results	50.0%	33.0%

Recommended reading

Basic literature	M. Barski, W. Jędruch , Układy Cyfrowe W. Majewski, Układy logiczne Zieliński C.: Podstawy projektowania układów cyfrowych, Wydawnictwo Naukowe PWN, Warszawa 2003
Supplementary literature	F. Tinder, Engineering Digital Design J. D. Daniels, Digital Design from Zero to One Texas Instruments, Digital Design Seminar
eResources addresses	Adresy na platformie eNauczanie: Technika cyfrowa, informatyka, studia niestacjonarne, semestr 3, 2023/24 - Moodle ID: 33983 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=33983

Example issues/ example questions/ tasks being completed	- Carry out the operation (10101)2 x (101) 2) the result reported in the decimal system, - The function f(d,c,b,a)= (0, 3, 5, 8, 12, 14, (2,11,13)) achieved using a a multiplexer 4/1 and NAND Gates. -Provide a table of trigger JK and D , - Design the table in a logical network to build the NAND Gate - Design the synchronous presence or within binary digits given in the series in the number of ones is an even number other than zero, which should be indicated by setting the output in=1 for exactly one clock cycle.
Work placement	Not applicable