GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Microprocessor Technologies, PG_00038439		
Field of study	Electrical Engineering		
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	4	ECTS credits	4.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Department of Power Electronics and Electrical Machines -> Faculty of Electrical and Control Engineering		

Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Artur Cichowski
	Teachers	dr inż. Krzysztof Iwan dr inż. Artur Cichowski

Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	30.0	0.0	0.0	60
	E-learning hours included: 0.0						
	Address on the e-learning platform: https://enauczanie.pg.edu.pl/moodle/course/view.php?id=11798						

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	60	4.0	36.0	100

Subject objectives	The objective of the course is for students to acquire knowledge and competencies in microprocessor techniques.

Learning outcomes	Course outcome	Subject outcome	Method of verification
	K6_W07	has knowledge of design and analyze digital circuits and programming microcontrollers in C language	[SW3] Assessment of knowledge contained in written work and projects
	K6_U01	can design and analyze digital circuits, is able to program microprocessors in C language	[SU4] Assessment of ability to use methods and tools [SU3] Assessment of ability to use knowledge gained from the subject [SU1] Assessment of task fulfilment [SU5] Assessment of ability to present the results of task
	K6_K01	is aware of the neccessity to extend their knowledge in digital techniques and microprocessors	[SK5] Assessment of ability to solve problems that arise in practice [SK4] Assessment of communication skills, including language correctness

Subject contents	LECTURE Fundamentals of digital electronics: combinational logic design, sequential logic design, basicmedium-scale integration logic circuits (multiplexers/demultiplexers, decoders, adders, memories, registers,counters). Architectures of microprocessors and microcontrollers. Central processing unit, bus, memory,input/output systems, registers, program counter, stack / stack pointer, interrupts. C language programmingof microprocessors (based on the STM32L496ZGT6 microcontroller in the STM32CubeIDE environment).Subroutines. Interrupt service routines. LABORATORY Use of the Quartus II design environment for thedesign, FPGA implementation and testing of basic logic circuits (gates, flip-flops, registers, counters,memories, and other combinational and sequential circuits). C-language programming ofthe STM32L496ZGT6 microcontroller. Use of I/O ports, interrupt service routines, buttons and switcheshandling, Software implementation of a daily clock with seven-segment displays, alphanumeric displayroutines, configuring and use of the embedded A/D converters and PWM channels.
Prerequisites and co-requisites	

Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Midterm colloquia	60.0%	20.0%
	Practical exercise	60.0%	80.0%

Recommended reading	Basic literature	1. Cichowski A., Śleszyński W., Szczepankowski P.: Technika cyfrowa i mikroprocesorowa, Politechnika Gdańska, Wydział Elektrotechniki i Automatyki, Gdańsk 2010.2. Galewski. M.: STM32. Aplikacje i ćwiczenia w języku C z biblioteką HAL. BTC; Legionowo 20193. Kurczyk A.: Mikrokontrolery STM32 dla początkujących. BTC; Legionowo 2019
	Supplementary literature	1. Skorupski A.: Podstawy techniki cyfrowej. Warszawa: WKŁ 2001.2. Paprocki. K.: Mikrokontrolery STM32 w praktyce. BTC; Legionowo 20093. Documentation of electronic modules4. STMicroelectronics documentations (product specifications, reference manuals for STM32L496ZGT6)5. Kernighan B. W., Ritchie D. M.: Język ANSI C. WNT, Warszawa 1998.
	eResources addresses	Adresy na platformie eNauczanie: TECHNIKI MIKROPROCESOROWE [ET][2023/24] - Moodle ID: 36072 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=36072

Example issues/ example questions/ tasks being completed	1) Minimize the boolean function defined by the given Karnaugh map. Draw the corresponding logic diagram using NAND gates. 2) Design a sequential logic circuit defined by the given state transition diagram. 3) Write a program to control the LEDs as a function of logical operations of the microcontroller inputs. 4) Write a LED control program with variants of preset sequences changed in case of pressing monostable switches.
Work placement	Not applicable