



Subject card

Subject name and code	Microprocessor Technologies, PG_00038439						
Field of study	Electrical Engineering						
Date of commencement of studies	October 2021		Academic year of realisation of subject		2022/2023		
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. 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_K01		is aware of the necessity to extend their knowledge in digital techniques and microprocessors		[SK5] Assessment of ability to solve problems that arise in practice		
	K6_W07		has knowledge of design and analyze digital circuits and programming microprocessors 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		
Subject contents	LECTURE Fundamentals of digital electronics: combinational logic design, sequential logic design, basic medium-scale integration logic circuits (multiplexers/demultiplexers, decoders, adders, memories, registers, counters). Architectures of microprocessors and microcontrollers. Central processing unit, bus, memory, input/output systems. Arithmetic-logic unit, general-purpose registers, program counter, stack / stack pointer. Interrupts. C language programming of microprocessors (based on the ATmega128 microcontroller). Fundamentals of microprocessor arithmetics. Subroutines. Interrupt service routines. LABORATORY Use of the Quartus II design environment for the design, FPGA implementation and testing of basic logic circuits (gates, flip-flops, registers, counters, memories, and other combinational and sequential circuits). C-language programming of the ATmega128 microcontroller. Use of I/O ports, interrupt service routines, keyboard handling, software implementation of a 24-hour clock, alphanumeric display routines, configuring and use of the embedded A/D converters and PWM channels. Application of the microcontroller in the control of a buck converter.						
Prerequisites and co-requisites							
Assessment methods and criteria	Subject passing criteria		Passing threshold		Percentage of the final grade		
	Practical exercise		60.0%		80.0%		
	Midterm colloquia		60.0%		20.0%		
Recommended reading	Basic literature		1. Cichowski A., Śleszyński W., Szczepankowski P.: Technika cyfrowa i mikroprocesorowa, Politechnika Gdańska, Wydział Elektrotechniki i Automatyki, Gdańsk 2010.				

	Supplementary literature	1. Skorupski A.: Podstawy techniki cyfrowej. Warszawa: WKŁ 2001. 2. Krzyżanowski R.: Układy mikroprocesorowe. MIKOM, Warszawa 2004. 3. Pełka R.: Mikrokontrolery: architektura, programowanie, zastosowania. WKŁ, Warszawa 2000. 4. Kernighan B. W., Ritchie D. M.: Język ANSI C. WNT, Warszawa 1998.
	eResources addresses	Adresy na platformie eNauczanie: TECHNIKI MIKROPROCESOROWE [ET][2022/23] - Moodle ID: 28504 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=28504
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	