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 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 neccessity 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	