GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Programming of microcontrollers with ARM core, PG_00054497					
Field of study	Electrical Engineering					
Date of commencement of studies	October 2021		Academic year of realisation of subject		2023/2024	
Education level	first-cycle studies		Subject group			
Mode of study	Part-time studies		Mode of delivery		at the university	
Year of study	3		Language of instruction		Polish	
Semester of study	6		ECTS credits		2.0	
Learning profile	general academic profile		Assessment form		assessment	
Conducting unit	Department of Controlled Electric Drives -> Faculty of Electrical and Control Engineering					
Name and surname of lecturer (lecturers)	Subject supervisor		prof. dr hab. inż. Marcin Morawiec			
	Teachers					

Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	10.0	0.0	20.0	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	5.0	15.0	50

Subject objectives	The aim of the course is to present microcontrollers with an ARM core. Discussion of the ARM architecture and the possibilities of its application in automation and electrical engineering as well as in everyday life. Deepening the programming skills in the C language by developing control functions. Programming the peripheral devices of the interface with the STM32F407 processor by the student allows to develop the skills of programming modern electronic devices.

Learning outcomes	Course outcome	Subject outcome	Method of verification
	K6_W10	knows the basics of processing, use and rational use of electricity, including the principles of electric traction	[SW3] Assessment of knowledge contained in written work and projects [SW1] Assessment of factual knowledge
	K6_W11	knows the principles of designing electrical installations and electric lighting, controlling electrical devices	[SW2] Assessment of knowledge contained in presentation [SW3] Assessment of knowledge contained in written work and projects [SW1] Assessment of factual knowledge
	K6_U10	The student knows the principles of designing simple electrical networks and installations	[SU3] Assessment of ability to use knowledge gained from the subject
	K6_U05	The student is able to follow the rules of occupational health and safety	[SU3] Assessment of ability to use knowledge gained from the subject
	K6_W09	The student will know the basics of electricity conversion	[SW3] Assessment of knowledge contained in written work and projects
	K6_U09	The student is able to select devices and apparatus for long-term load	[SU5] Assessment of ability to present the results of task
	K6_K05	The student is able to react appropriately in life-threatening conditions	[SK5] Assessment of ability to solve problems that arise in practice
	K6_K01	The student has self-education awareness related to software development	[SK4] Assessment of communication skills, including language correctness

Subject contents	1. ARM architecture
	2. ARM architecture.
	3.I / O ports
	4. C programming and bit operations
	5. Microcontroller interfaces (serial, parallel)
	6.A / C and C / A converter
	7.A / C and C / A converter cont.
	8.Interrupts, Timers, Clocks etc.
	9. Overview of sample programs
	10. Overview of sample programs cd.
	11. Cooperation of microcontroller with FPGA
	12.Wired and wireless interfaces (I2C, I2S, CAN)
	13.Wired and wireless interfaces (I2C, I2S, CAN) cont.
	14.Exemplary applications (voltage converter)
	15.Exemplary applications (voltage converter)
Prerequisites and co-requisites	Programming skills in C / C ++ at the basic level.

Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Laboratory	60.0%	70.0%
	Lecture	60.0%	30.0%

Recommended reading	Basic literature	1.Pełka R.: "Mikrokontrolery - architektura, programowanie, zastosowania". Wydawnictwa Komunikacji i Łączności, Warszawa 2003. 2.Baranowski R.: "Mikrokontrolery AVR ATmega w praktyce", BTC, Warszawa 2006. 3. Doliński J.: "Mikrokontrolery AVR w praktyce". BTC, Warszawa, 2004. 4. Paprocki K. "Mikrokontrolery STM32 w praktyce", Wydawnictwo BTC 2009. 5. www.arm.com 6. www.st.com 7. Yiu J.:The Definitive Guide to ARM® Cortex®-M3 and Cortex®-M4 Processors, Third Edition 2013.
	Supplementary literature	Websites, e.g.::www.st.comwww.arm.comhttp://stm32f4-discovery.comhttps://my.st.com
	eResources addresses	Adresy na platformie eNauczanie: PROGRAMOWANIE MIKROKONTROLERÓW [2022/23] - Moodle ID: 28469 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=28469
Example issues/ example questions/ tasks being completed	1. I / O ports software 2. Software for Timers, clocks, PWMs 3. A / C converter 4. USART serial communication 5. Interrupt controller	
Work placement	Not applicable	