Subject card

Subject name and code	Programming of ARM microcontrollers, PG_00031366						
Field of study	Electrical Engineering						
Date of commencement of studies	October 2022		Academic year of realisation of subject		2024/2025		
Education level	first-cycle studies		Subject group				
Mode of study	Full-time studies		Mode of delivery		at the university		
Year of study	3		Language of instruction		Polish		
Semester of study	6		ECTS credits		4.0		
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		dr inż. Filip Wilczyński				
	Teachers						
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						
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		5.0	35.0		100
Subject objectives	The aim of the course is to provide the ARM-core microcontrollers. The aim of the course is the discussion of the ARM architecture and its possible applications in automation and electrical engineering as well as in everyday life. Deepening programming skills in C by developing control functions. Programing by student the peripheral interface with STM32F407 processor allows to education programming skills of modern electronic devices.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	K6_K05	The student has knowledge in the field of occupational health and safety and is able to respond appropriately in a situation that threatens health and life	[SK5] Assessment of ability to solve problems that arise in practice [SK4] Assessment of communication skills, including language correctness [SK3] Assessment of ability to organize work
	K6_U09	The student is able to select equipment for the load and short-circuit conditions	[SU1] Assessment of task fulfilment [SU3] Assessment of ability to use knowledge gained from the subject
	K6_K01	The student has the need and awareness for self-education in microcontroller programming	[SK5] Assessment of ability to solve problems that arise in practice [SK1] Assessment of group work skills
	K6_W10	The student has knowledge of the basics of electricity conversion and the basics of electric traction	[SW1] Assessment of factual knowledge [SW2] Assessment of knowledge contained in presentation [SW3] Assessment of knowledge contained in written work and projects

Subject contents	1. ARM architecture
	2. ARM architecture
	3. Input/Output ports
	4. Programming in C
	5. Series and paraller microcontroller interfeces (RS232, USART...)
	6. A/C, C/A transducer
	7. A/C, C/A transducer
	8. Interruptions, timers, clocks...
	9. The examples of the program functions
	10. The examples of the program functions
	11. Microcontroller cooperation with FPGA
	12. The wire and wireless interfaces (I2C, I2S, CAN)
	13. The wire and wireless interfaces (I2C, I2S, CAN)
	14. Example applications
	15. Example applications

Prerequisites and co-requisites	The basic level of C/C++ programming skill.

Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Project	60.0%	20.0%
	The laboratory reports	60.0%	80.0%

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	The internet resources, e.g.:
		www.st.com
		www.arm.com
		http://stm32f4-discovery.com
		https://my.st.com
	eResources addresses	Adresy na platformie eNauczanie:
Example issues/ example questions/ tasks being completed	1. I/O ports programming	
	2. Timers, clocks and PWM programming	
	3. A/C transducer	
	4. USART communication	
	5. Interrupt controller	
Work placement	Not applicable	

Document generated electronically. Does not require a seal or signature.