



Subject card

Subject name and code	Microcontroller programming, PG_00059839						
Field of study	Automation, Robotics and Control Systems						
Date of commencement of studies	February 2024	Academic year of realisation of subject			2024/2025		
Education level	second-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	3	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	15.0	0.0	0.0	15.0	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		15.0		5.0	50
Subject objectives	The aim of the course is to discuss selected microcontrollers with ARM core. Discussion of the ARM architecture and the possibility of using it in automation systems. Deepening the skills of programming in the C language by developing control functions. The programming of peripheral devices of the interface with the STM32 processor by the student allows the student to develop programming skills of modern electronic devices.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	K7_W06		The student is able to design an electronic circuit		[SW3] Assessment of knowledge contained in written work and projects [SW1] Assessment of factual knowledge		
	K7_U04		The student is able to use the acquired knowledge to develop programming skills		[SU5] Assessment of ability to present the results of task [SU4] Assessment of ability to use methods and tools [SU1] Assessment of task fulfilment		

Subject contents	<p>1.ARM architecture</p> <p>2. ARM architecture.</p> <p>3.I/O Ports</p> <p>4. Programming in C and operations on bits</p> <p>5. Microcontroller interfaces (serial, parallel)</p> <p>6. A/C and D/A converter</p> <p>7. A/C and C/A converter continued.</p> <p>8. Interrupts, Timers, Clocks, etc.</p> <p>9. Overview of sample programs</p> <p>10. Discussion of sample programs cont.</p>											
Prerequisites and co-requisites	Basic programming skill in C/C++											
Assessment methods and criteria	<table border="1"> <thead> <tr> <th data-bbox="453 1028 794 1059">Subject passing criteria</th> <th data-bbox="799 1028 1141 1059">Passing threshold</th> <th data-bbox="1145 1028 1490 1059">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="453 1066 794 1093">Laboratory</td> <td data-bbox="799 1066 1141 1093">60.0%</td> <td data-bbox="1145 1066 1490 1093">75.0%</td> </tr> <tr> <td data-bbox="453 1099 794 1126">Lecture</td> <td data-bbox="799 1099 1141 1126">50.0%</td> <td data-bbox="1145 1099 1490 1126">25.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	Laboratory	60.0%	75.0%	Lecture	50.0%	25.0%
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Laboratory	60.0%	75.0%										
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Recommended reading	Basic literature	<p>1. Pełka R.: "Mikrokontrolery - architektura, programowanie, zastosowania". Wydawnictwa Komunikacji i Łączności, Warszawa 2003.</p> <p>2. Baranowski R.: "Mikrokontrolery AVR ATmega w praktyce", BTC, Warszawa 2006.</p> <p>3. Doliński J.: "Mikrokontrolery AVR w praktyce". BTC, Warszawa, 2004.</p> <p>4. Paprocki K. "Mikrokontrolery STM32 w praktyce", Wydawnictwo BTC 2009.</p> <p>5. www.arm.com</p> <p>6. www.st.com</p> <p>7. Yiu J.: The Definitive Guide to ARM® Cortex®-M3 and Cortex®-M4 Processors, Third Edition 2013.</p>										

	Supplementary literature	1. www.st.com 2. www.arm.com 3. http://stm32f4-discovery.com 4. https://my.st.com
	eResources addresses	Adresy na platformie eNauczanie:
Example issues/ example questions/ tasks being completed	1. Software I/O ports 2. Timers, clocks, PWM software 3. A/C converter 4. USART serial communication 5. Interrupt controller	
Work placement	Not applicable	