

COURSE DESCRIPTION CARD – SPECIMEN

Faculty of Electrical Engineering										
Field of study	Electrical and Electronics Engineering							Degree level and programme type	bachelor's degree, full time programme	
Specialization/ diploma path	-							Study profile	-	
Course name	Microcontrollers in Applications							Course code	IS-FEE-10020W	
								Course type	elective	
Forms and number of hours of tuition	L	C	LC	P	SW	FW	S	Semester	winter	
			30					No. of ECTS credits	4	
Entry requirements	-									
Course objectives	Teaching the development and testing of practical and advanced applications using microcontrollers and electronic components.									
Course content	Fundamentals programming of microcontrollers with ARM core. Practical I/O port operations. Alphanumeric and graphical display applications. Determination of the tilt using a MEMS sensor. Generating a multi-channel PWM signal to control the robot arm (model AL5A). Communication with GPS receiver. Using Bluetooth technology for remote voltage measurements. DC motor control. Implementation of color recognition system. DAC converter application to audio playback.									
Teaching methods	laboratory classes, presentation, discussion, specialization workshop									
Assessment method	evaluation of partial reports from the set of exercises									
Symbol of learning outcome	Learning outcomes								Reference to the learning outcomes for the field of study	
LO1	describes the operation of modern microcontrollers									
LO2	uses appropriate integrated development tools									
LO3	creates and verifies software supporting peripherals of the selected microcontroller									
LO4	implements the prepared algorithm of program operation									
Symbol of learning outcome	Methods of assessing the learning outcomes								Type of tuition during which the outcome is assessed	
LO1	evaluation of the report on exercise, a discussion during the									

	laboratory classes		
LO2	evaluation of the report on exercise, a discussion during the laboratory classes		
LO3	evaluation of the report on exercise, a discussion during the laboratory classes		
LO4	evaluation of the report on exercise, a discussion during the laboratory classes		
Student workload (in hours)		No. of hours	
Calculation	preparation for the laboratory	30	
	description of laboratory reports	20	
	participation in lab sessions or student-teacher consultations	30	
	prepare to pass the module	20	
	TOTAL:	100	
Quantitative indicators		HOURS	No. of ECTS credits
Student workload – activities that require direct teacher participation		30	1
Student workload – practical activities		100	4
Basic references	<ol style="list-style-type: none"> 1. Bansod T., Tawde P.: Microcontroller Programming (8051, PIC, ARM7 ARM Cortex), Shroff Publisher, 2017. 2. Martin T.: The insider's guide to the Philips ARM7-based microcontrollers. Hitex 2005. 3. Predko M.: Programming and Customizing the ARM7 Microcontroller, McGraw-Hill, 2011. 4. Touluson R., Wilmshurst T.: Fast and Effective Embedded Systems Design : Applying the ARM mbed, Newness, 2016. 5. Warwick A.S.: C Programming for Embedded Microcontrollers, Elektor Publishing, 2009. 6. Warwick A.S.: ARM Microcontroller Interfacing: Hardware and Software, Elektor Publishing, 2010 		
Supplementary references	<ol style="list-style-type: none"> 1. Kociszewski R.: Laboratory Guide. Course website. 2. LPC 214x – User manual. Philips Semiconductors 2004. 3. Hohl W.: ARM Assembly Language. Fundamentals and Techniques. CRC Press, 2014. 		
Organisational unit conducting the course	Department of Automatic Control and Robotics	Date of issuing the programme	
Author of the programme	Rafał Kociszewski, PhD Eng.	24.02.2021	

L – lecture, C – classes, LC – laboratory classes, P – project, SW – specialization workshop, FW - field work, S – seminar