GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Built-in systems, PG_00060476
Field of study	Mechatronics

Date of commencement of studies	October 2023	Academic year of realisation of subject	2025/2026
Education level	first-cycle studies	Subject group	Obligatory subject group in the field of study
			Subject group related to scientific research in the field of study
Mode of study	Full-time studies	Mode of delivery	at the university
Year of study	3	Language of instruction	Polish
Semester of study	5	ECTS credits	2.0
Learning profile	general academic profile	Assessment form	assessment

Conducting unit	Division of Mechatronics -> Institute of Mechanics and Machine Design -> Faculty of Mechanical Engineering and Ship Technology -> Wydziały Politechniki Gdańskiej
Name and surname of lecturer (lecturers)	**Subject supervisor** dr hab. inż. Marek Galewski
	Teachers dr hab. inż. Marek Galewski

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						
	eNauczanie source addresses:						
	Moodle ID: 42987 Systemy Wbudowane, W/L, MTR, I st., sem. 05, zimowy 2025/26 (???) https://enauczanie.pg.edu.pl/moodle/course/view.php?id=42987						

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	2.0	18.0	50

Subject objectives	Teaching students basic concepts of embedded systems and microcontrollers programming (in C language)

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K6_U09] is able to formulate an algorithm, knows low and high level programming languages and appropriate IT tools for developing computer programmes to control mechatronic system	Student develops simple programs that utilise essential elements of MCU system	[SU1] Assessment of task fulfilment
	[K6_W07] has organised knowledge in the field of metrology; knows and understands methods for measurement and processing of basic quantities that characterize mechatronic systems; knows basic methods of analogue and digital signals processing and computational methods and IT tools essential for analyses of experimental results	Student understands rules of performing analog and digital signals measurement tasks, specific fo embedded systems	[SW1] Assessment of factual knowledge
	[K6_W06] has organised knowledge in the field of informatic that includes architecture of computer systems, programming of computers and embedded systems and elements of software engineering	Student presents principles of operation of essential elements of embedded systems	[SW1] Assessment of factual knowledge

Subject contents	Lecture:
	Definitions of embeded systems, ways of implementation Microcontrollers - types, structure, ARM family Peripherals of micronotroller and it's main features - GPIO, IRQ, timers, DMA, ADC, data transmission Designs and manufacturing of mebeded systems Project: Programming tasks for STM32 microcontroller: GPIO, IRQ, meters, DMA, data transmission, ADC

Prerequisites and co-requisites	Konwledge of basics of computer systems archiotecture and basiec of programming C language

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Colloqium	52.0%	65.0%
Practical exercises	52.0%	35.0%

Recommended reading

Basic literature	Galewski M.STM32 Aplikacje i ćwiczenia w języku C z biblioteką HAL Marek Galewski, BTC, Legionowo, 2019 Huss E., The C Library Reference Guide http://www.acm.uiuc.edu/webmonkeys/book/c_guide/ Kernighan B. W., Ritchie D. M., The ANSI C Language, Prentice Hall, 1988 www.arm.com www.st.com/stonline/
Supplementary literature	Ali Mazidi M. Stm32 Arm Programming for Embedded Systems, 2018
eResources addresses	Basic http://www.arm.com - ARM Ltd. http://www.st.com/stonline/ - ST Microelectronics

Example issues/ example questions/ tasks being completed	What is an Embedded System? What is a microcontroller? Present it's most characteristic features and elements What are the most important features or ARM Cortex architecture? What elements are neede to build an embedded system based on microcontroller What are GPIO used for? Full list of example questions are presented to students before the end of semester
Work placement	Not applicable

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