GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Microprocessor Engineering, PG_00038098		
Field of study	Automation, Robotics and Control Systems		
Date of commencement of studies	October 2026	Academic year of realisation of subject	2027/2028
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	2	Language of instruction	Polish
Semester of study	4	ECTS credits	5.0
Learning profile	general academic profile	Assessment form	exam
Conducting unit	Department of Control Engineering -> Faculty of Electrical and Control Engineering -> Faculties of Gdańsk University of Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Andrzej Kopczyński	
	Teachers		

Lesson types

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	8.0	57.0	125

Subject objectives

Understanding the basic concepts and issues concerning the operation of microcontrollers and microprocessor systems.
Getting to know the methods and tools for programming microprocessors and their peripherals.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_W05] has basic knowledge of the principles of operation of basic electronic, energy and power electronic components and systems	Student explain the rules of microprocesor system work, distinguish base types of microprocesor systems architectures, describes base glases of memories and I/O uP system devices, knows base intefeaces.	[SW3] Assessment of knowledge contained in written work and projects
[K6_U01] can obtain information from literature, databases and other sources; integrate the information obtained, interpret it and draw conclusions, formulate and justify opinions	Student is able to applicate a proper literature and develope simpleprograms using C lenguage an Assembler for microcomupers 8051 family and ARM Cortex M3.	[SU1] Assessment of task fulfilment
[K6_K02] can work in a group taking on different roles in it	Student can work in group and use specialized tools for family 8051 and ARM microprocesors for creation and staring programs.	[SK1] Assessment of group work skills

Subject contents	Course content – lecture LECTURE Microprocessor - the idea and history. Methods of data representation in microprocessor systems. Data encoding standards. Basic arithmetic and logical operations on binary data. Microprocessor system, the basic components and architecture. Internal structure and operating principle of a typical microprocessor. Programming in assembler and C language. Tools to build and run the software. Implementation of embedded software in the system. Microcontrollers from 8051 family: internal structure, modes of operation, the list of instructions. Characteristics of integrated peripheral components: ports, time-counters, interrupt controller, serial transmission system. Memory of microprocessor systems - types, characteristics, structure. Principles of cooperation between central processing unit, memory and I/O devices. Coupling of typical peripheral devices to the microprocessor. Methods of parallel and serial data transmission. Methods of measuring time and frequency. A/C and C/A converters. Microcontrollers of other families: AVR, PIC, ARM. Examples of the use of microcontrollers in automation systems. LABORATORY The aim of the laboratory is to acquire the practical skills of microcontroller programming and knowledge of tools used for this purpose. Laboratory classes consist of the preparation and testing of simple programs written in C and Assembler. The programs are tested on evaluation boards with microcontrollers from 8051 and STM32F1 family and typical elements of the input/output.
Prerequisites and co-requisites	1. Basic knowledge of digital technology. 2. Ability to program in C language.
Assessment methods and criteria	

Subject passing criteria	Passing threshold	Percentage of the final grade
Written exam	60.0%	50.0%
Practical exercise	60.0%	50.0%

Recommended reading	Basic literature	1. Starecki T.: Mikrokontrolery 8051 w praktyce, Wydawnictwo BTC, Warszawa 2002 2. Bogusz J.:, Programowanie mikrokontrolerów 8051 w języku C w praktyce, BTC, Warszawa 2005 3. Gałka P., Gałka P.: Podstawy programowania mikrokontrolera 8051, MIKOM, Warszawa 2002 4. Rydzewski A.: Mikrokomputery jednoukładowe rodziny MCS-51. WNT, Warszawa 1992 5. Paprocki P.:, Mikrokontrolery STM32 w praktyce, BTC, Warszawa 2009 6. Galewski M.: STM32. Aplikacje i ćwiczenia w języku C, BTC, Warszawa 2011
	Supplementary literature	1. Bogusz J.: Lokalne interfejsy szeregowe, BTC, Warszawa 2004 2. Daca W.: Mikrokontrolery - od układów 8-bitowych do 32-bitowych. Wydawnictwo MIKOM, Warszawa 1992 3. Hadam P.: Projektowanie systemów mikroprocesorowych, Wydawnictwo BTC, Warszawa 2004
	eResources addresses	
Example issues/ example questions/ tasks being completed	Sample topics of laboratory exercises: 1. The use of the microcontroller input/output ports 2. Logic controller function implementation 3. 7-segment LED display driver implementation 4. The use of LCD alphanumeric display 5. The use of the microcontroller timers 6. Interrupts handling 7. Communication via UART interface	
Practical activites within the subject	Not applicable	

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