GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Embedded Systems, PG_00047844		
Field of study	Biomedical Engineering		
Date of commencement of studies	October 2023	Academic year of realisation of subject	2025/2026
Education level	first-cycle studies	Subject group	Optional subject group 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	6	ECTS credits	3.0
Learning profile	general academic profile	Assessment form	exam
Conducting unit	Faculty of Electronics, Telecommunications and Informatics		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Adam Bujnowski	
	Teachers	dr inż. Adam Bujnowski	

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	15.0	0.0	15.0	0.0	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	3.0	42.0	75

Subject objectives

To familiarize students with construction, and programming of the embedded systems. The input and output stages and the control unit types. A typical input and output data methods will be shown. Exemplary problems related with the constriction of microprocessor systems, microcontrollers, programmable chips (FPGA) , SoC, SoM's and examples of the control algorithms. During the laboratory the practical knowledge will be presented covering the area of typical input/output conrol and typical algorithms.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_U03] can design, according to required specifications, and make a simple device, facility, system or carry out a process, specific to the field of study, using suitable methods, techniques, tools and materials, following engineering standards and norms, applying technologies specific to the field of study and experience gained in the professional engineering environment	Student is able to designe controll system on the basis of given specification Student is able to design and implement controll algorithm for designed system	[SU1] Assessment of task fulfilment [SU4] Assessment of ability to use methods and tools
[K6_W04] Knows and understands, to an advanced extent, the principles, methods and techniques of programming and the principles of computer software development or programming devices or controllers using microprocessors or programmable elements or systems specific to the field of study, and organisation of systems using computers or such devices	Student is able to create apllications for embedded systems. Student understands and knows specific methods for implementing and applying code for embedded systems. Studeent knows specific tools for programming of embedded systems	[SW3] Assessment of knowledge contained in written work and projects
[K6_U07] can apply methods of process and function support, specific to the field of study	Student can write software for medical data acquisition Student can design circuit for controlling of the selected physical parameter (pressyre, temperature, etc.)	[SU1] Assessment of task fulfilment [SK5] Assessment of ability to solve problems that arise in practice [SU4] Assessment of ability to use methods and tools

Subject contents	Pricipal definitions - embedded system, Requirements criteria dor the embedded systems Operationg systems of the embedded systems Available hardware platforms for the embedded systems CPU's for the embedded systems, microcontrollers, SoC's etc. Typical CPU architectires - Intel, ARM, MIPS Methods of reliability improvements Application creation for the embedded systems Power supply in the embedded systems Application testing and debugging in the embedded systems Interfaces and IO system in the ebedded systems Typical applications for the embedded systems
Prerequisites and co-requisites	Programming (C,C++) Digital circuits basics Principles of electronics

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
final writting	50.0%	50.0%
laboratory achievements	50.0%	50.0%

Recommended reading

Basic literature	A. Bujnowski , Systemy wbudowane - skrypt do przedmiotu Martin Evans , Jordan Hochenbaum , Joshua Noble, Arduino w akcji,Helion 2014 Kazimierz Lal , Krzysztof Orkisz , Tomasz Rak, RTLinux - system czasu rzeczywistego Helion , Styczeń 2003
Supplementary literature	Tomasz Francuz, AVR. Układy peryferyjne Helion , Maj 2014 Tomasz Francuz, Język C dla mikrokontrolerów AVR. Od podstaw do zaawansowanych aplikacji Helion , Lipiec 2011 http://mirekk36.blogspot.com/
eResources addresses	Adresy na platformie eNauczanie:

Example issues/ example questions/ tasks being completed	
Work placement	Not applicable