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 2024	Academic year of realisation of subject	2026/2027
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_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.)	[SU4] Assessment of ability to use methods and tools [SK5] Assessment of ability to solve problems that arise in practice [SU1] Assessment of task fulfilment
	[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_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	[SU4] Assessment of ability to use methods and tools [SU1] Assessment of task fulfilment

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
	laboratory achievements	50.0%	50.0%
	final writting	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