



## Subject card

Subject name and code	Embedded Systems in Medicine, PG_00068772						
Field of study	Biomedical Engineering, Biomedical Engineering, Biomedical Engineering						
Date of commencement of studies	February 2026	Academic year of realisation of subject			2025/2026		
Education level	second-cycle studies	Subject group			Optional subject group Specialty 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	1	Language of instruction			Polish		
Semester of study	1	ECTS credits			3.0		
Learning profile	general academic profile	Assessment form			assessment		
Conducting unit	Department of Microelectronic Systems -> Faculty of Electronics Telecommunications and Informatics -> Faculties of Gdańsk University of Technology						
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Piotr Kurgan					
	Teachers	dr inż. Piotr Kurgan					
Lesson types	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		4.0		41.0	75
Subject objectives	The objective of the course is to introduce a student to the basics of programmable electronic systems based on circuits in FPGA and Arduino technology.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K7_U09] can carry out a critical analysis of the functioning of existing technical solutions and assess these solutions, as well as apply experience related to the maintenance of advanced technical systems, devices and facilities typical for the field of studies, gained in the professional engineering environment	Student uses Vivado Design Suite software to implement basic functionalities of FPGA circuits based on Verilog/SystemVerilog. Student employs Arduino IDE software to program electronic systems in Arduino technology.	[SU1] Assessment of task fulfilment
	[K7_U04] can apply knowledge of programming methods and techniques as well as select and apply appropriate programming methods and tools in computer software development or programming devices or controllers using microprocessors or programmable elements or systems specific to the field of study, making assessment and critical analysis of the prepared software as well as a synthesis and creative interpretation of information presented with it	Student programs circuits in FPGA and Arduino technology in an entry-level degree.	[SU1] Assessment of task fulfilment
	[K7_W04] knows and understands, to an increased extent, the principles, methods and techniques of programming and the principles of computer software development or programming devices or controllers using microprocessors or other elements or programmable devices specific to the field of study, and organization of work of systems using computers or such devices	Student discusses fundamental elements of Verilog/SystemVerilog and Arduino languages.	[SW1] Assessment of factual knowledge
[K7_W03] knows and understands, to an increased extent, the construction and operating principles of components and systems related to the field of study, including theories, methods and complex relationships between them and selected specific issues - appropriate for the curriculum	Students knows basic range of problems on Arduino peripheral device operation.	[SW1] Assessment of factual knowledge	
Subject contents	<p>Course content – lecture</p> <ol style="list-style-type: none"> <li>1. Introduction to programmable microelectronic systems.</li> <li>2. Programming platform for Arduino embedded systems.</li> <li>3. Programming Arduino using C.</li> <li>4. Description of digital circuits using Verilog/SystemVerilog.</li> <li>5. Introduction to Arduino: hardware, programming environment, code structure.</li> <li>6. Digital and analog I/O. Basic operations on I/O.</li> <li>7. Communicating and controlling peripheral devices. Discussing selected peripheral devices.</li> <li>8. Introduction to Python. Discussing language capabilities based on selected examples.</li> </ol>		
Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Laboratory - assessment of laboratory task realization	50.0%	50.0%
	Lecture - test in the end of the semester	50.0%	25.0%
	Lecture - test in the middle of the semester	50.0%	25.0%

Recommended reading	Basic literature	[1] K., Skahill, <i>VHDL for Programmable Logic</i> , Addison-Weseley Publishing, Inc., 1996  [2] M. Margolis, <i>Arduino Cookbook</i> , O'Reilly, 2012  [3] J. Purdum, <i>Beginning C for Arduino</i> , Apress, 2012  [4] P. Desai, <i>Python programming for Arduino</i> , Packt Publishing Limited, 2015
	Supplementary literature	M. Banzi, <i>Getting Started with Arduino</i> , O'Reilly, 2008
	eResources addresses	
Example issues/ example questions/ tasks being completed		
Practical activites within the subject	Not applicable	

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