GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Microelectronic Embedded Systems, PG_00048581		
Field of study	Electronics and Telecommunications, Biomedical Engineering, Biomedical Engineering, Biomedical Engineering		
Date of commencement of studies	February 2024	Academic year of realisation of subject	2024/2025
Education level	second-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	1	Language of instruction	Polish
Semester of study	2	ECTS credits	3.0
Learning profile	general academic profile	Assessment form	exam
Conducting unit	Department of Microelectronic Systems -> Faculty of Electronics, Telecommunications and Informatics		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Marek Wójcikowski	
	Teachers	dr hab. inż. Marek Wójcikowski	

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	15.0	45
	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	45	6.0	24.0	75

Subject objectives	To become acquainted with the structure and capabilities of microelectronic embedded systems.

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[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	configures the real-time operating system in designed embedded systems	[SU1] Assessment of task fulfilment
	[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.	knows the structure and operation of selected real-time operating systems	[SW1] Assessment of factual knowledge
	[K7_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	knows the structure, properties and applications of embedded systems;	[SW1] Assessment of factual knowledge
	[K7_U03] can design, according to required specifications, and make a complex 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	designs and runs embedded systems based on programmable systems,	[SU1] Assessment of task fulfilment

Subject contents	1 Embedded systems definitions. 2 Embedded systems internals – hardware. 3 Microprocessors and microcontrollers in embedded systems. 4 FPGAs in embedded systems. 5 Memories in embedded systems. 6 Buses in embedded systems. 7 Input/output circuits in embedded systems. 8 Analog circuits in embedded systems. 9 Embedded systems diagnostics. 11 Embedded systems internals – software. 12 Programming languages for embedded systems. 13 Operating systems used for embedded systems. 14 Linux as an operating system for embedded systems. 15 Linux kernel configuration. 16 Linux system bootloaders. 17 Linux device drivers. 18 File systems in Linux. 19 Tools and methods for embedded Linux configuration. 20 Programmer's tools for embedded Linux. 21 Linux as a real-time operating system. 22 Description of some commercial real-time operating systems. 23 Compilator configuration. 24 Linker configuration. 25 Compilation process automation. 26 Wishbone bus.

	27 System on Chip technology. 29 Network on Chip technology. 30 Importance of power consumption reduction in embedded systems. 31 Hardware power consumption reduction methods. 32 Software power consumption reduction methods. 33 Reliability of embedded systems.
Prerequisites and co-requisites	Knowlege of VHDL (or Verilog) and C/C++ language. Recommended knowledge of Microelectronic Programmable Systems.
Assessment methods and criteria	

Subject passing criteria	Passing threshold	Percentage of the final grade
Seminar	50.0%	20.0%
Laboratory	50.0%	40.0%
Examination	50.0%	40.0%

Recommended reading	Basic literature	T. Noergard, „Embedded Systems Architecture”, Elsevier 2005 J. Ganssle, „The Art of Designing Embedded Systems”, Elsevier, 2008. Xilinx, www.xilinx.com J. Catsoulis, „Designing Embedded Hardware”, O’Reilly Media, 2005.
	Supplementary literature	No requirements.
	eResources addresses	Adresy na platformie eNauczanie:
Example issues/ example questions/ tasks being completed		
Work placement	Not applicable	