GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	System On Chip Programmable Systems, PG_00048577		
Field of study	Electronics and Telecommunications		
Date of commencement of studies	February 2023	Academic year of realisation of subject	2022/2023
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	1	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. Bogdan Pankiewicz	
	Teachers	dr hab. inż. Bogdan Pankiewicz	

Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	15.0	15.0	0.0	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	The main aim of the subject is to introduce to programmable system on chip devices with emphasis to analogue programmable blocks. Lecture material covers solutions of few leading SoC manufactures, one of them will be presented in more details. During laboratory students perform few exercises and get familiar with development kit and IDE. During project student or group of students perform micro-electronic system designs using development boards or specially designed own PCB.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[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		[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.		[SW1] Assessment of factual knowledge
[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		[SU1] Assessment of task fulfilment

Subject contents

Lecture:

1.Introduction, basic concepts, SOC classification. 2.Comparison of selected SOC IC in terms of technical capability and costs. 3.Integrated circuits Smartfusion I i II from Microsemi. 4.PSoC family from Cypress. 5.Common resources of the chip: clocking, WDT, RTC, power management and others. 6.Analog and digital I/Os and their usage. 7.CPU subsystem.
RAM and Flash memory, program and debug interfaces. 8.Integrated digital interfaces such as: CAN, USB, I2C and others. 9.Programmable digital block. 10.Programmable analog block.11.Connecting of analog, programmable digital and CPU subsystems. 12.Testing of implemented designs. 13.Power supply, PCB consideration and other practical aspects. 14.IDE Environment for Cypress PSOC or Microsemi Smartfusion II devices.
Lab:
1.Introduction to lab. Description of laboratory sets. 2.Tutorial on using software. 3.Simple exercise focused on the use of the CPU block. 4.Exercise devoted to programmable digital block and CPU utilization. 5.Execution of simple exercise with the use of analog, programmable digital and CPU subsystems.
Project:
1.Introduction to the project, assigning of tasks. 2.Preparation of preliminary assumptions, division of tasks into individual blocks. 3.Design of the analog subsystem. 4.Design of the programmable digital part of the project. 5.CPU configuration and software preparation. 6.Software preparation and debag of the project. 7.Presentation of the projects.

Prerequisites and co-requisites

Programming language C/C++. Verilog HDL knowlege.

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Labs	51.0%	33.0%
Exam	51.0%	34.0%
Project	51.0%	33.0%

Recommended reading

Basic literature

[1] Tammy Noregaard, „Embeded Systems Architecture”, Elsevier, 2005.
[2] www.cypress.com/psoc

	Supplementary literature	[3] http://www.microsemi.com/products/fpga-soc/soc-fpgas [4] Ł. Hawryłko, „Programowalne systemy w układzie scalonym (SoC)”, MSC thesis, 2014. [5] www.xilinx.com
	eResources addresses	Adresy na platformie eNauczanie:
Example issues/ example questions/ tasks being completed		
Work placement	Not applicable	