GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Digital Signal Processors and Programmable Logic, PG_00049084		
Field of study	Automatic Control, Cybernetics and Robotics		
Date of commencement of studies	October 2020	Academic year of realisation of subject	2023/2024
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	4	Language of instruction	Polish
Semester of study	7	ECTS credits	4.0
Learning profile	general academic profile	Assessment form	exam
Conducting unit	Department of Automatic Control -> Faculty of Electronics, Telecommunications and Informatics		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Krzysztof Cisowski	
	Teachers	dr inż. Krzysztof Cisowski	

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	30.0	0.0	15.0	0.0	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	4.0	51.0	100

Subject objectives

The aim of the course is to familiarize the student with the construction, programming and practical application of digital signal processors.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_U06] can analyse the operation of components, circuits and systems related to the field of study, measure their parameters and examine technical specifications	The student describes and knows how to use in practice the methods of analysis of the operation of elements and systems related to the field of automation and to measure their parameters and test technical characteristics	[SU4] Assessment of ability to use methods and tools [SU1] Assessment of task fulfilment
[K6_W03] Knows and understands, to an advanced 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	The student knows the elements of architecture DSP processor. The student describes and knows the basic principles of DSP programming. The student knows the DSP processor input and output system. The student knows DSP interrupt system.	[SW3] Assessment of knowledge contained in written work and projects [SW2] Assessment of knowledge contained in presentation
[K6_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	Student describes and put to use in practice elements of DSP processor. The student describes and knows how to use in practice elementary principles of DSP programming. The student describes and knows how to use in practice DSP processor input and output system. The student describes and knows how to use the DSP processor interrupt system in practice. The student describes and knows how to use DSP processors in practice	[SU4] Assessment of ability to use methods and tools [SU1] Assessment of task fulfilment

Subject contents	1. Definition and characteristic features which distinguish Digital Signal Processors (DSP) form General Purpose Processors (GPS). 2. Examples of applications of DSPs. 3. Classification of signal processors. 4. History of DSPs development. 5. DSP benchmark programs. 6. DSP manufacturers. 7. DSP structure – examples. 8. Architecture and instruction set of TMS320C6713 and TMS320C5515 DSPs. 9. Development systems: TMS320C6713 DSK and TMX320C5515 eZDSP v2 USB Stick. 10. Code Composer Studio 3.3 i 4.0 (CCS). 11. Selected algorithms of digital signal processing: FFT, digital filters, digital audio effects, synthesis and detection of DTMF tones, 12. Examples of programs for TMS320C6713 and TMS320C5515 DSPs. 13. Definition and characteristic features of FPGA circuits. 14. Demonstration of capabilities of VIRTEX 5 circuit using HYUGA EVM board.
Prerequisites and co-requisites	

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Projects and examination	50.0%	100.0%

Recommended reading

Basic literature	1. R. Chassaing, D. Reay, Digital signal processing and Applications with the C6713 and C6416 DSK, Wiley-Interscience 2008. 2. Sophocles J. Orfanidis, *Introduction to Signal Processing*, Copyright c 2010 by Sophocles J. Orfanidis, 3. S.M. Kuo, B.H. Lee, Real-Time Digital Signal Processing, Implementations, Applications, and Experiments with the TMS320C55x, J. Wiley & Sons, Ltd. 2001, 4. Tomasz P. Zieliński, "Cyfrowe przetwarzanie sygnałów Od teorii do zastosowań Wydanie 2 poprawione" Wydawnictwo WKiŁ, 2009. 5. Borodziewicz W., Jaszczak K., *Cyfrowe Przetwarzanie sygnałów*, Wydawnictwo Naukowo-Techniczne W-wa 1987. 6. Wojtkiewicz A. *Elementy syntezy filtrów cyfrowych*, Wydawnictwo Naukowo-Techniczne W-wa 1984. *7. DSP56000, 24-BIT DIGITAL SIGNAL PROCESSOR FAMILY MANUAL*, Motorola, Inc. Semiconductor Products Sector DSP Division 6501 William Cannon Drive, West Austin, Texas 78735-8598, 1995. 8. Steven W. Smith, "Cyfrowe przetwarzanie sygnałów DSP Praktyczny poradnik dla inżynierów i naukowców", Wydawnictwo BTC, 2007. 9. Mark Owen, "Przetwarzanie sygnałów w praktyce" Wydawnictwo WKiŁ, 2009. 9. P. Zbysiński, J. Majewski, "Układy FPGA w przykładach" Wydawnictwo BTC 2007.
Supplementary literature	_
eResources addresses	Adresy na platformie eNauczanie:
Example issues/ example questions/ tasks being completed	
Work placement	Not applicable