GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	The programming of distributed measurement systems, PG_00054493					
Field of study	Electrical Engineering					
Date of commencement of studies	October 2021		Academic year of realisation of subject		2023/2024	
Education level	first-cycle studies		Subject group			
Mode of study	Part-time studies		Mode of delivery		at the university	
Year of study	3		Language of instruction		Polish	
Semester of study	6		ECTS credits		2.0	
Learning profile	general academic profile		Assessment form		assessment	
Conducting unit	Department of Metrology and Information Systems -> Faculty of Electrical and Control Engineering					
Name and surname of lecturer (lecturers)	Subject supervisor		dr inż. Beata Pałczyńska			
	Teachers		dr inż. Beata Pałczyńska			

Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	0.0	15.0	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	5.0	15.0	50

Subject objectives	Introducing the principles of the organization of distributed measurement systems (DMS), with particular emphasis on network systems (NDMS). Ability to use major techniques used in DMS software. Formation of skills in the field of NDMS software, fully based on the graphical interface of the G language, which is the basis for programming in the LabVIEW graphical environment (National Instruments).

Learning outcomes	Course outcome	Subject outcome	Method of verification
	K6_W11	The student designs an application that controls the transmission of measurement results between computers in the network, based on one of the technologies available in a graphical programming environment.	[SW3] Assessment of knowledge contained in written work and projects
	K6_W10	The student has knowledge of methods of powering measurement systems.	[SW3] Assessment of knowledge contained in written work and projects [SW1] Assessment of factual knowledge
	K6_U05	The student knows the rules of occupational health and safety.	[SU2] Assessment of ability to analyse information
	K6_U09	The student identifies different types of measurement systems. The student recognizes the methods and equipment used to transmit the measurement results.	[SU3] Assessment of ability to use knowledge gained from the subject
	K6_W09	The student analyzes the energy requirements of the measuring system.	[SW1] Assessment of factual knowledge
	K6_K05	The student knows the rules of the safe operation of measuring instruments.	[SK1] Assessment of group work skills
	K6_U10	The student can use the regulations and standards.	[SU2] Assessment of ability to analyse information
	K6_K01	The student knows the basics of programming in a graphical programming environment. The student selects the tools appropriate to the measurement task.	[SK5] Assessment of ability to solve problems that arise in practice

Subject contents	
	Lectures: The organization of the distributed measurement system (DMS). Main techniques using the possibilities of the dispersion of the measurement system. The hardware architecture of the DMS. The special requirements of programming of the DMS. The design methodology of distributed measurement systems in the integrated programming environment LabVIEW. LabVIEW communication techniques for network distributed applications: communication methods, implementing communication tasks. The data transfer; non-deterministic (LabVIEW Shared Variable, Low Level Protocols (TCP/UDP), Data Socket); deterministic (NI Time-Triggered Variables, Reflective Memory). The remote application automation (VI Server). Communication tasks (data streaming, remote user interface, automating execution of remote system, Closed-loop control over Ethernet).

Project: Practical aspects of DMS network programming in the LabVIEW environment. Analysis of the design task, determining the requirements for the system, design stages. Preparation of applications that control the transfer of measurement results between computers in the network, using the functions from the Data Communication palette.

Launch of SRSP built on the basis of one of the following technologies: Data Socket Write-Read, TCP Open-Close Connection, Network Streams, Shared Variables. |

Prerequisites and co-requisites	

Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Project - running application	60.0%	80.0%
	Lecture - test	60.0%	20.0%

Recommended reading		
	Basic literature	1. Winiecki W.: Organizacja komputerowych systemów pomiarowych, Oficyna Wydawnicza PW, Wyd. 1, Warszawa 1997. 2. Świsulski D.: Komputerowa technika pomiarowa, Agenda Wydawnicza PAK, Warszawa 2005. 3. Lesiak P., Świsulski D.: Komputerowa technika pomiarowa w przykładach, Agenda Wydawnicza PAK, Warszawa, 2002.
	Supplementary literature	Wells L.: LabVIEW Student Edition User`s Guide, Prentice Hall. 2010

	eResources addresses	Podstawowe
		http://www.ni.com - Website of the software producer
		Adresy na platformie eNauczanie:
		OPROGRAMOWANIE ROZPROSZONYCH SYSTEMÓW POMIAROWYCH [ET][I][Niestacjonarne][2023/24] - Moodle ID: 36009 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=36009
Example issues/ example questions/ tasks being completed	1. Characterize a DMS concept. 2. Describe an exemplary structure of the DMS. 3. List communication methods using in the DMS. 4. Describe features of Data Socket Technology 5. Describe features of TCP/IP Technology 6. Describe features of LabVIEW Shared Variable 7. Describe features of Network Data Streaming The student designs the DMS in group. Starts the application that controls the transfer of measurement results between computers in the network, which is presented during a short presentation.	
Work placement	Not applicable	