GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	The programming of distributed measurement systems, PG_00044111		
Field of study	Electrical Engineering		
Date of commencement of studies	October 2023	Academic year of realisation of subject	2025/2026
Education level	first-cycle studies	Subject group	
Mode of study	Full-time studies	Mode of delivery	at the university
Year of study	3	Language of instruction	English
Semester of study	5	ECTS credits	2.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Partment of Metrology and Information Systems -> Faculty of Electrical and Control Engineering -> Wydziały Politechniki Gdańskiej		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Beata Pałczyńska	
	Teachers		

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	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_K05	applies the principles of safe operation of measuring instruments.	[SK5] Assessment of ability to solve problems that arise in practice
K6_K01	designs applications in a graphical programming environment. Selects tools appropriate to the measurement task.	[SK5] Assessment of ability to solve problems that arise in practice
K6_U10	applies current regulations and standards in the engineering project.	[SU2] Assessment of ability to analyse information
K6_W10	selects the appropriate method of powering measurement systems.	[SW3] Assessment of knowledge contained in written work and projects [SW1] Assessment of factual knowledge
K6_U09	identifies different types of measurement systems. Recognizes the methods and equipment used to transmit the measurement results.	[SU3] Assessment of ability to use knowledge gained from the subject

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). **Laboratory:** 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
Lecture - test	60.0%	20.0%
Laboratoryt - running application	60.0%	80.0%

Recommended reading

Basic literature	1. Nawrocki W.: Rozproszone systemy pomiarowe, Wydawnictwa Komunikacji i Łączności, Warszawa 2006 2. Świsulski D.: Przykłady cyfrowego przetwarzania sygnałów w LabVIEW, Wydawnictwo Politechniki Gdańskiej, Gdańsk 2014. 3. Lesiak P., Świsulski D.: Komputerowa technika pomiarowa w przykładach, Agenda Wydawnicza PAK, Warszawa, 2002. 4. Haasz, V., ed. Advanced Distributed Measuring Systems: Exhibits of Application. Vol. 8. River Publishers, 2012 5. Pałczyńska B., Noga K. M.: Sieciowy rozproszony system pomiarowy w laboratorium dydaktycznym, Zeszyty Naukowe Wydziału Elektrotechniki i Automatyki Politechniki Gdańskiej Nr 52, Wydawnictwo Wydziału Elektrotechniki i Automatyki Politechniki Gdańskiej, Gdańsk 2017. 6. PRASETIO, Barlian Henryranu, et al. Study of voice data communication using network streams on dataflow programming. In: *MATEC Web of Conferences*. EDP Sciences, 2018.
Supplementary literature	Wells L.: LabVIEW Student Edition User`s Guide, Prentice Hall. 2010
eResources addresses	Adresy na platformie eNauczanie:

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

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