GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	, PG_00053427
Field of study	Automation, Robotics and Control Systems

Date of commencement of studies	October 2022	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	4	Language of instruction	Polish
Semester of study	7	ECTS credits	3.0
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	40.0	75

Subject objectives	To familiarize the student with methods and tools for programming virtual measurement systems. The student will master the ability to design and test a virtual measuring instrument.

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K6_U01] can obtain information from literature, databases and other sources; integrate the information obtained, interpret it and draw conclusions, formulate and justify opinions	analyzes available methods of implementing a system based on virtual instruments.	[SU2] Assessment of ability to analyse information
	[K6_U03] can prepare and present a presentation on the problems and results of an engineering task	presents the concept of a measurement system programmed in a graphical software environment.	[SU5] Assessment of ability to present the results of task [SU1] Assessment of task fulfilment
	[K6_W10] has basic knowledge related to mechatronics and robotics systems	implements a measurement system based on virtual instruments. Selects tools appropriate to the measurement task.	[SW3] Assessment of knowledge contained in written work and projects
	[K6_W06] knows the structure of computers and microprocessors and the tasks of operating systems, has basic knowledge of the basics of computer software, drivers, microprocessor technology, design of simple algorithms and the operation of information networks	designs an application in a graphical measurement environment that performs the function of a measuring instrument.	[SW3] Assessment of knowledge contained in written work and projects

Subject contents	LECTURE: The virtual instrument (VI) as a generous trend in measurement instrumentation. The conception of the virtual measuring instruments. The structure and the organization of computer-based measuring systems. The basis functional blocks. The measurement system configuration. The programming panels. The graphical user interface. The hardware of VIs. The multi-function data acquisition board DAQ - construction and applications. DAQ signals, The signal conditioning. The interface standards in measuring system. The system interface bus. The serial interface. Measuring systems based on IEC-625 interface. The software environment for development of measurement systems. Introduction to LabVIEW development environment, graphical programming language G, Virtual Instrument as basic module of creating application in G language. Integration of VIs to computer network. VIs working under RTOS. LABORATORY Design and implementation of VIs, practical aspects. Advantages and disadvantages of VIs - analysis of development.
Prerequisites and co-requisites	Basic knowledge of electrical metrology.

Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Lecture - final test	60.0%	20.0%
	Laboratory - completed exercises	100.0%	80.0%

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. Świsulski D.: Przykłady cyfrowego przetwarzania sygnałów w LabVIEW, Wydawnictwo Politechniki Gdańskiej, Gdańsk 2014 4. Lesiak P., Świsulski D.: Komputerowa technika pomiarowa w przykładach, Agenda Wydawnicza PAK, Warszawa, 2002. 5. Jerome, Jovitha. Virtual instrumentation using LabVIEW. PHI Learning Pvt. Ltd., 2010.
	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 virtual instrument concept. 2. Describe a data acquisition path in a typical computer-based measurement system 3. The serial interface basic characteristics. 4. The parallel interface basic characteristics. 5. The principles of using standard interfaces like RS-232, USB, GPIB to configure a virtual measurement system controlled by a PC. 6. The principles of designing DAQ measurement system.
Work placement	Not applicable

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