GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	The virtual measurement instruments, PG_00044110		
Field of study	Electrical Engineering		
Date of commencement of studies	October 2024	Academic year of realisation of subject	2026/2027
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 -> Faculties of Gdańsk University of Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Beata Pałczyńska	
	Teachers		

Lesson types

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

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_K01	designs applications supporting the programming of measurement systems.	[SK3] Assessment of ability to organize work
K6_W10	determines the power supply conditions for the hardware part of the virtual measurement instrument.	[SW3] Assessment of knowledge contained in written work and projects
K6_U10	designs a power supply system for various interfaces in the measurement system	[SU3] Assessment of ability to use knowledge gained from the subject [SU4] Assessment of ability to use methods and tools
K6_K05	follows safety rules in the event of a failure of the measuring stand-up.	[SK5] Assessment of ability to solve problems that arise in practice
K6_U09	selects power equipment in the measurement system.	[SU3] Assessment of ability to use knowledge gained from the subject

<table>
<tr><td>Subject contents</td><td>Course content – lecture
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.</td></tr>
<tr><td>Prerequisites and co-requisites</td><td>Basic knowledge of electrical metrology.</td></tr>
<tr><td>Assessment methods and criteria</td><td>
<table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>Laboratory - completed exercises</td><td>100.0%</td><td>80.0%</td></tr>
<tr><td>Lecture - final test</td><td>60.0%</td><td>20.0%</td></tr>
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<tr><td>Recommended reading</td><td>
<table>
<tr><td>Basic literature</td><td>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.</td></tr>
<tr><td>Supplementary literature</td><td>Wells L.: LabVIEW Student Edition User`s Guide, Prentice Hall. 2010</td></tr>
<tr><td>eResources addresses</td><td></td></tr>
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<tr><td>Example issues/ example questions/ tasks being completed</td><td>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.</td></tr>
<tr><td>Practical activites within the subject</td><td>Not applicable</td></tr>
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