GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Designing of measurement systems in integrated programming environments, PG_00053431		
Field of study	Electrical Engineering		
Date of commencement of studies	October 2021	Academic year of realisation of subject	2024/2025
Education level	first-cycle studies	Subject group	
Mode of study	Part-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	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		

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	4.0	41.0	75

Subject objectives

To introduce students with the principles of organization of measurement systems, with communication standards used in wired and wireless systems. Developing skills in the field of software design of measurement systems. Ability to virtualize measurement and adapt the results. Developing skills in designing the hardware structure of measurement systems. Getting to know the operation of the programming environment 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	The student knows the rules of conduct in the event of a failure of the measuring stand-up.	[SK5] Assessment of ability to solve problems that arise in practice
K6_K01	The student knows the software supporting the measurement systems software.	[SK3] Assessment of ability to organize work

Subject contents

Lecture: Organization of measurement systems. Measuring instruments for work in computer measuring systems, measuring instruments of the Virtual Instruments class. Integrated software environments. Methodology of designing and creating applications, i.e. graphical source code, graphical user interface, running and testing programs. Communication with measuring instruments. Definition of remote measurement. Standards for communication with instruments. Interface in the measurement system. Interface system bus. Serial interfaces. IEC-625 interface system standard. VISA library. Programming of Data Acquisition Board (DAQ) card. Characteristics of card drivers and ways of using them in the software. Internet technologies in measurement systems (Data Socket Server, TCP Connection, Network Streams, Shared Variables).Laboratory: Getting to know the methods of programming, building a software project using external devices and measuring instruments. Practical aspects of programming in the LabVIEW environment. Data Acquisition Board (DAQ) card's software. Remote control of measuring instruments via GPIB. Analysis of the design task, determining the requirements for the system, design stages. Starting the measuring system. Running the hardware and software. Causes of measurement systems failures.

Prerequisites and co-requisites

Basic knowledge of electrical metrology.

<table>
<tr><td>Assessment methods and criteria</td><td colspan="2"><table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>Laboratory - running application</td><td>60.0%</td><td>80.0%</td></tr>
<tr><td>Lecture - final test</td><td>60.0%</td><td>20.0%</td></tr>
</table></td></tr>
<tr><td rowspan="3">Recommended reading</td><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. Lesiak P., Świsulski D.: Komputerowa technika pomiarowa w przykładach, Agenda Wydawnicza PAK, Warszawa, 2002.
4. 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>Adresy na platformie eNauczanie:</td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td colspan="2">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>Work placement</td><td colspan="2">Not applicable</td></tr>
</table>