GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Integration and Visualisation of Automatics Systems, PG_00059282		
Field of study	Automation, Robotics and Control Systems		
Date of commencement of studies	February 2023	Academic year of realisation of subject	2023/2024
Education level	second-cycle studies	Subject group	
Mode of study	Full-time studies	Mode of delivery	at the university
Year of study	1	Language of instruction	Polish
Semester of study	2	ECTS credits	3.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Department of Control Engineering -> Faculty of Electrical and Control Engineering		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Krzysztof Armiński	
	Teachers	dr inż. Krzysztof Armiński	

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	15.0	0.0	15.0	15.0	0.0	45

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	45	7.0	23.0	75

Subject objectives

Preparing students to use automation systems in industrial applications and integrate them with information systems. Learning to design and program complex industrial automation systems using PLC and HMI/ SCADA.

Learning outcomes

Course outcome	Subject outcome	Method of verification
K7_U10	The student learns the principles of describing control systems and analyzing their operation, learns the principles of creating and testing control programs and testing the created communication links	[SU4] Assessment of ability to use methods and tools [SU3] Assessment of ability to use knowledge gained from the subject
K7_W08	The student learns the basic structures and principles of creating automation systems with programmable devices - PLC, HMI/ SCADA. The student analyzes the task and creates the concept of the control system, selects the hardware, functional and communication structure. He adopts the assumptions of the communication network. The student creates structured control programs in FBD and/or ladder language using standard structuring and programming techniques, creates ergonomic visualization interfaces. The student knows the principles of industrial equipment communication: physical connections, rules and parameters of network node configuration and data exchange programming.	[SW1] Assessment of factual knowledge

<table>
<tr><td>Subject contents</td><td>Lecture:

Contemporary architecture (conceptual, functional, physical, integration, operational) of distributed systems and their design principles. Containerization as a tool to ensure separation and reliability in information systems. Running containers in a production environment. Network communication in automation systems as an integration tool: REST API on the server and client side. Principles of building visualization systems in automatic control structures.

Laboratory and Project

Configuration and programming of control systems using communication networks to implement control, protection and signaling functions. Programming of complex systems with PLC and frequency converters and drives, configuration and programming of the above control systems with visualization. Use of PC to simulate control objects as a tool to verify the correctness of control systems. Cooperation of PLC with SCADA system.</td></tr>
<tr><td>Prerequisites and co-requisites</td><td>Knowledge of subjects: Fundamentals of Automation, Continuous Process Control, Computer Science, Fundamentals of Digital Technology, Microprocessor Technology, Industrial Computer Networks, Programmable Controllers.
PLC and PC programming skills. Basic knowledge of SCADA systems.</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>Lecture</td><td>50.0%</td><td>40.0%</td></tr>
<tr><td>Laboratory</td><td>50.0%</td><td>30.0%</td></tr>
<tr><td>Project</td><td>50.0%</td><td>30.0%</td></tr>
</table></td></tr>
<tr><td>Recommended reading</td><td><table>
<tr><td>Basic literature</td><td>1. Kwaśniewski J.: Programowalne sterowniki przemysłowe w systemach sterowania, ZP Roma-Pol, Kraków, 1999.
2. Legierski T., Wyrwał J., Kasprzyk J., Hajda J.: Programowanie sterowników PLC, Wydawnictwo Pracownia Komputerowej Jacka Skalmierskiego ,Gliwice, 1998.
3. Seta Z.: Wprowadzenie do teorii sterowania. Wykorzystanie programowalnych sterowników PLC., Mikom, Warszawa, 2002.
4. Winiecki W., Nowak J., Stanik S.: Graficzne zintegrowane środowiska programowe do projektowania komputerowych systemów pomiarowo kontrolnych, Mikom, Warszawa, 2001.
5. Jakuszewski R: Programowanie systemów SCADA, Pracownia komputerowa Jacka Skalmierskiego, Gliwice, 2006.
6. Bass L., Clements P., Kazman R.: Docker. Praktyczne zastosowania. Wydanie II, 2019 ISBN: 978-83-283-5604-7</td></tr>
<tr><td>Supplementary literature</td><td>1. Documentation - user manual PLC SAIA, Control Maestro i InTouch 7.0.</td></tr>
<tr><td>eResources addresses</td><td>Adresy na platformie eNauczanie:</td></tr>
</table></td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td>• Establish communication between the PLC and your own PC program.
• Establish the connection between the PLC and the SCADA system.
• Development of a control system. And its implementation on the PLC.
• Preparation of the control object simulator.</td></tr>
<tr><td>Work placement</td><td>Not applicable</td></tr>
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