



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 2026		Academic year of realisation of subject		2026/2027		
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 -> Faculties of Gdańsk University of Technology						
Name and surname of lecturer (lecturers)	Subject supervisor		dr inż. Krzysztof Armiński				
	Teachers		dr inż. Krzysztof Armiński				
Lesson types	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						
	eNauczanie source address: https://enauczanie.pg.edu.pl/2025/course/view.php?id=913						
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 for the practical use of automation systems in industrial applications. Learning design and development of complex industrial automation systems with the use of PLC and SCADA.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[K7_U10] is able to apply the known mathematical tools and methods and computer techniques to analyse and evaluate automation and robotics components, devices, systems and systems		Student knows the principles of designing control and control systems based on drivers and visualization systems.		[SU4] Assessment of ability to use methods and tools [SU1] Assessment of task fulfilment		
	[K7_W08] has in-depth knowledge of program development and design of complex systems automation systems using PLC and SCADA, transmission and processing of signals occurring in a variety of physical objects		Student can design selected automated system based on programmable controllers and a visualization system.		[SW1] Assessment of factual knowledge		

Subject contents	Course content – lecture		
	• PLC controllers and visualization systems in the multi-layer structure of automatic control. • General characteristics of PLC controllers and SCADA systems. • Principles of programming and designing automation systems using PLC and SCADA. • User communication with the control system. • Control and visualization systems for industrial processes. • Requirements for visualization systems. • The role of visualization systems within the information structure of an enterprise. • Recording and processing data from measurement and control devices in visualization systems. • Integration of visualization systems with decision-making systems. • Introduction to the system decomposition matrix. • Preparation for project and laboratory activities.		
	Course content – laboratory		
	Design of the control system for a selected automated process using PLC controllers and a SCADA or HIL environment. The laboratory activities include: • Analysis of the operation of the selected automation system. • Development of the set of input and output signals. • Definition of technical assumptions and required functions. • Development of the control algorithm. • Determination of the testing scope and execution of system performance and correctness tests. • Preparation of documentation for the implemented system.		
	Course content – project		
	As part of the project, the student: • Selects or is assigned an automated system to be developed. • Creates a functional model of the system (a set of input/output signals, a list of control and visualization functions, a description of the PLCSCADA communication structure). • Develops a system decomposition matrix (division of the system into layers and functional modules, mapping of information and signal flows, analysis of dependencies between control operations and visualization). • Based on the decomposition matrix, prepares the project, including: control algorithms, visualization screen structure, alarm and diagnostics logic, and communication between system modules. • Presents conclusions regarding the use of the decomposition matrix as a tool supporting PLCSCADA system design. • Prepares the final documentation of the control and visualization system.		
Prerequisites and co-requisites	• Basic knowledge of automation and electrical engineering • Knowledge of issues related to technical safety and occupational health and safety (OHS) • Familiarity with fundamental automation components (sensors, actuators, controllers) • Understanding of the principles of operation and design of control systems • Basic skills in PLC programming • Knowledge of basic computer science and industrial communication networks • Basic skills in working with operating systems and engineering software		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Lecture	50.0%	40.0%
	Project	0.0%	20.0%
	Laboratory	0.0%	40.0%
Recommended reading	Basic literature	• Kwaśniewski J.: Programowalne sterowniki przemysłowe w systemach sterowania, ZP Roma-Pol, Kraków, 1999. • Legierski T., Wyrwał J., Kasprzyk J., Hajda J.: Programowanie sterowników PLC, Wydawnictwo Pracownia Komputerowej Jacka Skalmierskiego, Gliwice, 1998. • Seta Z.: Wprowadzenie do teorii sterowania. Wykorzystanie programowalnych sterowników PLC., Mikom, Warszawa, 2002. • Winiecki W., Nowak J., Stanik S.: Graficzne zintegrowane środowiska programowe do projektowania komputerowych systemów pomiarowo kontrolnych, Mikom, Warszawa, 2001. • Jakuszewski R.: Programowanie systemów SCADA, Pracownia komputerowa Jacka Skalmierskiego, Gliwice, 2006.	
	Supplementary literature	• Dokumentacja - podręcznik użytkownika PLC SAIA, Control Maestro i InTouch 7.0.	
	eResources addresses		
Example issues/ example questions/ tasks being completed			
Practical activities within the subject	Not applicable		

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