GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Integration and Visualisation of Automatics Systems, PG_00059282		
Field of study	INTEGRACJA I WIZUALIZACJA SYSTEMÓW AUTOMATYKI		
Date of commencement of studies	February 2025	Academic year of realisation of subject	2025/2026
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 prof. dr hab. inż. Roman Śmierzchalski dr inż. Tomasz Zubowicz	

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

Moodle ID: 913 INTEGRACJA I WIZUALIZACJA SYSTEMÓW AUTOMATYKI [ARiSS][2025/26] 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_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] Ocena wiedzy faktograficznej
[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.	[SU1] Ocena realizacji zadania [SU4] Ocena umiejętności korzystania z metod i narzędzi

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 softwar

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Laboratory	0.0%	40.0%
Project	0.0%	20.0%
Lecture	50.0%	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 activites within the subject

Not applicable

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