GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Industrial Computer Networks, PG_00038099		
Field of study	Electrical Engineering		
Date of commencement of studies	October 2026	Academic year of realisation of subject	2028/2029
Education level	first-cycle studies	Subject group	Obligatory subject group in the field of study Subject group related to scientific research in the field of study
Mode of study	Full-time studies	Mode of delivery	at the university
Year of study	3	Language of instruction	Polish
Semester of study	5	ECTS credits	2.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Department of Electric Drives and Energy Conversion -> Faculty of Electrical and Control Engineering -> Faculties of Gdańsk University of Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Filip Wilczyński	
	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	2.0	18.0	50

Subject objectives

The aim of the course is to provide a method of data exchange in industrial automation systems using serial interfaces, OPC, SCADA and dedicated software for programmable logic controllers.

Learning outcomes

Course outcome	Subject outcome	Method of verification
K6_K02	He/she is able to prepare together a report on a laboratory exercise.	[SK3] Assessment of ability to organize work [SK4] Assessment of communication skills, including language correctness
K6_U05	The student makes a proper selection of the IT network for the controlled and visualised process. He or she uses visualisation software with a SCADA class database system.	[SU3] Assessment of ability to use knowledge gained from the subject [SU4] Assessment of ability to use methods and tools
K6_W10	The student lists and characterizes the basic types of IT networks, explains how to connect network devices and voltage standards of the physical network layer. The student demonstrates how to configure network protocols in the configuration programs of programmable controllers and OPC servers.	[SW3] Assessment of knowledge contained in written work and projects

<table>
<tr><td>Subject contents</td><td>Course content – lecture

LECTURE
General characteristics of Industrial Networks. Problems of electronic control and supervision in industrial environment. Classification of control and supervision systems - practical applications of electronic systems: PLC controllers, industrial computers, SCADA systems. Network systems of control and supervision. Distributed and centralized control. Real-time networks. Network models: Seven-layer ISO-OSI RM model, Four-layer model. Sample industrial networks - construction, characteristic elements, area of application. Local networks - Profibus, AS-I, CAN (Devicenet, CanOpen). Data exchange in the Ethernet network. Network configuration. Specialized software. Sample communication drivers: universal OPC client, Modbus RTU driver, Modbus TCP driver, GE Fanuc and Siemens controllers drivers.

LABORATORY

1. Practical application of a network standard serial communication R485.
2. Practical application of data exchange system using CAN network.
3. Global Pocket Radio Service in GSM system.
4. OPC with SCADA system.</td></tr>
<tr><td>Prerequisites and co-requisites</td><td>Basic skills connected with PLC and electronics.</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>Reports from laboratory</td><td>50.0%</td><td>20.0%</td></tr>
<tr><td>Entry test</td><td>50.0%</td><td>80.0%</td></tr>
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</td></tr>
<tr><td>Recommended reading</td><td>
<table>
<tr><td>Basic literature</td><td>1. Mielczarek W.: Interfejsy szeregowe Helicon 1993.
2. Legierski T., Wyrwał J.: Programowanie sterowników PLC. WPK J. Skalmierskiego, Gliwice 1998.
3. Magrel L.: Uzdatnianie wody i oczyszczanie ścieków. Wyd. Ekonomia i Środowisko, Białystok, 1999.
4. Jakuszewski R.: Programowanie systemów SCADA. WPK J. Skalmierskiego, Gliwice 2002.
5. Bednarek M. : Wizualizacja procesów - laboratorium. Oficyna Wydawnicza Politechniki Rzeszowskiej, Rzeszów 2001.</td></tr>
<tr><td>Supplementary literature</td><td>1. Kwiecień A.,: Analiza przepływu informacji w komputerowych sieciach przemysłowych.WPK J. Skalmierskiego, Gliwice 2000.
2. Solnik W., Znajda Z.: Komputerowe sieci przemysłowe Profibus DP i MPI. Oficyna Wydawnicza Politechniki Wrocławskiej, Wrocław 2004.</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. Show transient of SDU variable 27 frame for 8 data bits 1 bit parity 1 stop bit.
2. Modbus RTU Paremtry.
3. The structure of the GSM network to GPRS data transmission.
4. What is packet data?
5. The speeds and distances to work jaich CAN.
6. What is COM and DCOM?
7. Types of Profibus protocols.</td></tr>
<tr><td>Practical activites within the subject</td><td>Not applicable</td></tr>
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