



Subject card

Subject name and code	, PG_00053436						
Field of study	Electrical Engineering						
Date of commencement of studies	October 2020		Academic year of realisation of subject		2023/2024		
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 Controlled Electric Drives -> Faculty of Electrical and Control Engineering						
Name and surname of lecturer (lecturers)	Subject supervisor		dr inż. Mirosław Włas				
	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	The main objective of the course is to implement classical systems for visualisation and control of industrial processes involving drive systems with frequency converters, constructed on the basis of SCADA class software.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	K6_K01		The student, working in a group, prepares a report based on the available literature and conducted laboratory tests.		[SK2] Assessment of progress of work [SK5] Assessment of ability to solve problems that arise in practice		
	K6_K05		The student knows the principles of safety, the principles of designing machine safety systems and the principles of first aid.		[SK4] Assessment of communication skills, including language correctness [SK3] Assessment of ability to organize work		

Subject contents	<p>Lecture</p> <p>The subject is a continuation and supplementation of the subject Industrial Automation Systems. The main content is a combination of industrial automation systems with database systems of the MES (Manufacturing Enterprise System), MRP (Manufacture Resource Planning) class, implementation of complex systems of visualisation and industrial process control based on SCADA class software. Preparation of databases and database programmes (History) for cooperation with enterprise IT systems. Creation of new applications allowing to manage production and operation of automation system. Basic structures of IT systems for controlling, monitoring and managing the production of electric drive systems. Hardware requirements for visualisation systems and databases. Relational databases: SQL and MySQL. Company solutions for integration and visualisation systems: IFIX by GE and Orchestra by Wonderware. Structures of industrial automation systems. Design of industrial automation systems at the level of control and visualisation of industrial objects control with industrial computers (operator stations) and SCADA visualisation software. Laboratory (groups of 12) During the realization of laboratory exercises, students are familiarized with a wide range of tasks performed by the modern production process automation systems with the use of PLCs, frequency converters with induction motors, servo drives with PMSM motors, through visualization and process control from the level of SCADA class control and supervisory stations, up to analysis of the collected data focused on processing and analysis of statistical data and searching for historical events affecting production statistics. Presentation of possibilities of cooperation of SCADA class software with MS Windows environment software and Historian programs. On 7 laboratory workstations there were gathered controllers programmable operator panels, modules in data acquisition and port servers and Ethernet backbone network consisting of wireless router and industrial switches in a ring arrangement. The laboratory is equipped with PC computers, SCADA software: InTouch 10.0, Vijeo Citec 6.0, iFIX 4.5, as well as drive systems, industrial automation systems and controllers constituting models of real industrial objects and one server station responsible for collecting and making available information retrieved from individual laboratory stations.</p>		
Prerequisites and co-requisites	The subject is a continuation and complement of the subject "Industrial Computer Networks" and "Industrial Automation Systems".		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	lecture quiz	50.0%	10.0%
	laboratory report	50.0%	90.0%
Recommended reading	Basic literature	<p>Jakuszcwski R.: Programowanie systemów SCADA. WPK J. Skalmierskiego, Gliwice 2002</p> <p>Legierski T., Wyrwał J.: Programowanie sterowników PLC. WPK J. Skalmierskiego, Gliwice 1998</p> <p>Szmajdziński J.: Co warto wiedzieć o napięciowych przemiennikach częstotliwości Wydawnictwo Politechniki Rzeszowskiej 2001</p> <p>Bednarek M. : Wizualizacja procesów laboratorium. Oficyna Wydawnicza Politechniki Rzeszowskiej, Rzeszów 2001</p>	
	Supplementary literature	<p>1. InTouch Tworzenie i serwisowanie aplikacji wybrane zagadnienia</p> <p>Podrecznik szkoleniowy Gdansk 2005 2. AVEVA InTouch Podręcznik Użytkownika</p>	
	eResources addresses	<p>Podstawowe</p> <p>https://www.eaton.com/content/dam/eaton/products/low-voltage-power-distribution-controls-systems/low-voltage-switchgear/xenergy-main/polish/eaton-engineering-guide-combined-pl.pdf - Design guide</p> <p>https://www.eaton.com/content/dam/eaton/country/poland/catalogs-page/polish-catalogs/eaton-specialist-guide-pl-pl.pdf - professional handbook</p> <p>Adresy na platformie eNauczenie:</p>	

<p>Example issues/ example questions/ tasks being completed</p>	<ol style="list-style-type: none"> 1. Visualisation and control of a food centrifuge drive system. 2. Drive of a goods-passenger lift with an induction motor. 3. Remote control of a water pumping station in Żuławy using GPRS. 4. Automatic control of a set of 2 drinking water pumps working on a common collector. 5. Drive of a conveyor belt. 6. Drive of milk homogenizer with soft starter. 7. Visualisation and control of a technological line for homogenised cheese production. 8. Water treatment station. 9. Control of 3-axis milling plotter.
<p>Work placement</p>	<p>Visit to Global Maritime</p> <p>https://www.globalmaritime.com/</p>