



Subject card

Subject name and code	Computer Control Systems, PG_00038129						
Field of study	Automation, Robotics and Control Systems						
Date of commencement of studies	October 2021	Academic year of realisation of subject			2023/2024		
Education level	first-cycle studies	Subject group			Optional subject group 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	6	ECTS credits			5.0		
Learning profile	general academic profile	Assessment form			exam		
Conducting unit	Faculty of Electrical and Control Engineering						
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Jarosław Tarnawski					
	Teachers	dr inż. Jarosław Tarnawski dr hab. inż. Kazimierz Duzinkiewicz					
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	30.0	0.0	0.0	60
	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	60	8.0		57.0	125	
Subject objectives	Presentation of centralized and distributed / decentralized control structures. The introduction of advanced adaptive, predictive control methods. Acquainted with the infrastructure of computer control systems - DCS and SCADA / PLC systems. The integration of knowledge from different fields to the needs of a computer control system synthesis. Introduction to methods of decision support - multi-purpose and multi-attribute-approach.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	K6_K02		The student during laboratory classes on the synthesis of advanced control system performs tasks in groups by changing roles within the team.		[SK2] Assessment of progress of work		
	K6_W07		The student is able to define the role of all necessary elements and build a control system		[SW1] Assessment of factual knowledge		
	K6_U07		The student is able to create advanced computer-controlled control system		[SU5] Assessment of ability to present the results of task		
Subject contents	Control systems structures: classical, centralized, multilayer, decentralized, distributed. Implementation of centralized/decentralized with/without data exchange with communication aspects (time relationships, data loss, stability). Multilayer and distributed control systems based on real large scale systems: drinking water distribution systems, sewer system, oil refinery. Requirements for computer controlled systems. Information structure of CCS. Software and hardware selection for practical implementation of CCS. Implementation of selected complex control algorithms in computer-like devices: microcontrollers, PLCs, PACs and industrial computers. SCADA system realization - supervisory control with coordination among all control layers. Process data acquisition and archiving. Realization of optimization layer. Solver selection for optimization purposes.						

Prerequisites and co-requisites	Finished courses: - Dynamic Systems - Real Time Systems - Programmable Logic Controllers - Industrial Communication Networks														
Assessment methods and criteria	<table border="1"> <thead> <tr> <th data-bbox="459 477 794 510">Subject passing criteria</th> <th data-bbox="802 477 1137 510">Passing threshold</th> <th data-bbox="1145 477 1481 510">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="459 510 794 544">Written exam</td> <td data-bbox="802 510 1137 544">50.0%</td> <td data-bbox="1145 510 1481 544">40.0%</td> </tr> <tr> <td data-bbox="459 544 794 577">Practical exercise</td> <td data-bbox="802 544 1137 577">50.0%</td> <td data-bbox="1145 544 1481 577">30.0%</td> </tr> <tr> <td data-bbox="459 577 794 611">Midterm colloquium</td> <td data-bbox="802 577 1137 611">50.0%</td> <td data-bbox="1145 577 1481 611">30.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	Written exam	50.0%	40.0%	Practical exercise	50.0%	30.0%	Midterm colloquium	50.0%	30.0%
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Example issues/ example questions/ tasks being completed	<p>What are the differences between centralized and distributed control system Outline the main features and benefits of predictive control Enter the difference between direct and indirect adaptive control Introduce hierarchicznego structure of the control system and specify the tasks of each layer What is the method of AHP? What are the principles of the design of the control system</p>														
Work placement	Not applicable														