



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 2023		Academic year of realisation of subject		2025/2026		
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						
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_W07] has basic knowledge related to control and automation systems		The student is able to define the role of all necessary elements and build a control system		[SW1] Assessment of factual knowledge		
	[K6_K02] can work in a group taking on different roles in it		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_U07] can build and analyze models of systems and systems in the field related to control systems and automation		The student is able to build an 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 archivisation. 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	Subject passing criteria	Passing threshold	Percentage of the final grade
	Written exam	50.0%	40.0%
	Midterm colloquium	50.0%	30.0%
	Practical exercise	50.0%	30.0%
Recommended reading	Basic literature	Korbicz J., Kościelny J., Modelowanie, diagnostyka i sterowanie nadrzędne procesami Implementacja w systemie DiaSter, WNT, 2009 Tatjewski P. Sterowanie zaawansowane obiektów przemysłowych, Akademicka Oficyna Wydawnicza EXIT, 2002 Grega W. Metody i algorytmy sterowania cyfrowego w układach scentralizowanych i rozproszonych, Wydawnictwo AGH, 2004 Niederliński A. Systemy komputerowe automatyki przemysłowej, tom 1, Sprzęt i oprogramowanie, WNT, 1984. Niederliński A. Systemy komputerowe automatyki przemysłowej, tom 2, Zastosowania, WNT, 1985.	
	Supplementary literature	Trybus L. Regulatory wielofunkcyjne, WNT, 1992 Astrom K., Wittenmark B., Computer-Controlled Systems: Theory and Design (3rd Edition), Prentice Hall, 1996	
	eResources addresses	Adresy na platformie eNauczanie:	
	Example issues/ example questions/ tasks being completed	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	
Work placement	Not applicable		