GDAŃSK UNIVERSITY OF TECHNOLOGY

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 2020	Academic year of realisation of subject	2022/2023
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. Tomasz Rutkowski dr hab. inż. Robert Piotrowski dr inż. Jarosław Tarnawski	

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	The student is able to classify control systems. The student is able to build centralized and distributed control systems. The student builds a hierarchical predictive control system.	[SW3] Assessment of knowledge contained in written work and projects
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_U07	The student is able to set up a control system in a hardware loop with a model of the object simulated in real time and PLC control devices and SCADA class software.	[SU1] Assessment of task fulfilment

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	1. Korbicz J., Kościelny J., Modelowanie, diagnostyka i sterowanie nadrzędne procesami Implementacja w systemie DiaSter, WNT, 2009 2. Tatjewski P. Sterowanie zaawansowane obiektów przemysłowych, Akademicka Oficyna Wydawnicza EXIT, 2002 3. Grega W. Metody i algorytmy sterowania cyfrowego w układach scentralizowanych i rozproszonych, Wydawnictwo AGH, 2004 4. Niederliński A. Systemy komputerowe automatyki przemysłowej, tom 1, Sprzęt i oprogramowanie, WNT, 1984. 5. Niederliński A. Systemy komputerowe automatyki przemysłowej, tom 2, Zastosowania, WNT, 1985.
Supplementary literature	1. Trybus L. Regulatory wielofunkcyjne, WNT, 1992 2. 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 systemOutline the main features and benefits of predictive controlEnter the difference between direct and indirect adaptive controlIntroduce hierarchicynego structure of the control system and specify the tasks of each layerWhat is the method of AHP?What are the principles of the design of the control system
Work placement	Not applicable