GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Control in industrial objects, PG_00058309		
Field of study	Automation, Robotics and Control Systems		
Date of commencement of studies	October 2022	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	4	Language of instruction	Polish
Semester of study	7	ECTS credits	4.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Department of Control Engineering -> Faculty of Electrical and Control Engineering		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Marcin Śliwiński	
	Teachers		

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	30.0	0.0	0.0	15.0	0.0	45

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	45	2.0	53.0	100

Subject objectives

The aim of the course is to present selected industrial facilities and the interrelation of the control systems with the industrial technology used in them. With a focus on automation systems process automation systems, sequential automation systems; control and protection automation systems in nuclear power plant and refinery.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_K04] can react in abnormal and emergency situations, threats to health and life when using automation and robotics components and systems	The student has basic knowledge of the application of the methodology of functional safety.	[SK2] Assessment of progress of work [SK4] Assessment of communication skills, including language correctness
[K6_U07] can build and analyze models of systems and systems in the field related to control systems and automation	Students are able to make a simple model of a part of a process plant section in simulation software simulation software.	[SU4] Assessment of ability to use methods and tools [SU2] Assessment of ability to analyse information [SU1] Assessment of task fulfilment
[K6_U09] is able to use artificial intelligence methods and understands the advantages and limitations of using this type of tools in engineering	The student has advanced knowledge of the application of methods of artificial intelligence.	[SU1] Assessment of task fulfilment [SU4] Assessment of ability to use methods and tools
[K6_W11] knows the hazards arising from devices, installations, systems and technical systems, basic principles of occupational health and safety, taking into account the role of control and security systems in controlling automation and robotics facilities	Students will be able to assess threats from outside on the functioning of a distributed system control and safety.	[SW3] Assessment of knowledge contained in written work and projects [SW1] Assessment of factual knowledge

<table>
<tr><td>Subject contents</td><td>Lecture The scope includes discussion of the structure of a modern enterprise using selected examples of industrial facilities: systems for object measurements and actuators; systems for controlling processes (BPCS; DCS) and their supervision from a central control room (alarm system; SCADA); systems of protection automation systems (SIS; SRS; ESD) and production management systems with elements of enterprise management systems (SAP; ERP; MES). The cooperation of the individual systems within the layered control system structure, from the direct control (and protection) layer through the master control systems to the management and production planning layer. Classification of facilities and automation systems in facilities with reference to the technologies used. Characteristics functional, technical and organisational characteristics of facility systems. Ship automation system, control sequential control, energy and power system, wind farms, petrochemical installations petrochemical and nuclear power plants. Illustration of interactions between the controlled object and the the control unit. Discuss the quantities characterising the controlled object, taking into account the technological aspects of the facilities under consideration.

Project. Computerised control, monitoring (SCADA) and protection automation systems used in typical industrial facilities. Examples of sequential control systems.
The execution and measurement subsystems in BPCS, DCS, SIS and ESD systems used in industrial facilities.
industrial facilities. Introduction to modelling of technological processes occurring in typical industrial facilities using Flownex SE software.</td></tr>
<tr><td>Prerequisites and co-requisites</td><td></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>Project evaluation</td><td>60.0%</td><td>30.0%</td></tr>
<tr><td>Pass-fail test part 2</td><td>60.0%</td><td>35.0%</td></tr>
<tr><td>Pass-fail test part 1</td><td>60.0%</td><td>35.0%</td></tr>
</table>
</td></tr>
<tr><td>Recommended reading</td><td>
<table>
<tr><td>Basic literature</td><td>1. K.T. Kosmowski red.: Podstawy bezpieczeństwa funkcjonalnego. Wydawnictwo Politechniki Gdańskiej, 2020.
2. J. Stokłosa, T. Bilski, T. Paszkowski: Bezpieczeństwo danych w systemach informatycznych.
3. R. Andersen: Inżynieria zabezpieczeń. WNT Warszawa
4. M. Karbowski: Podstawy kryptografii. Helion.
5. Z. Bubnicki: Teoria i algorytmy sterowania. PWN, Warszawa 2005.</td></tr>
<tr><td>Supplementary literature</td><td>1. Hoyland A., Rausand M.: System Reliability Theory. Models and Statistical Methods. New York: John Wiley & Sons, Inc. 1994.</td></tr>
<tr><td>eResources addresses</td><td>Adresy na platformie eNauczanie:</td></tr>
</table>
</td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td>1 State the differences between SIS and BPCS?
2. Why are layered safety systems used in process plants?</td></tr>
<tr><td>Work placement</td><td>Not applicable</td></tr>
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