GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Automatics and control, PG_00058359		
Field of study	Hydrogen Technologies and Electromobility		
Date of commencement of studies	October 2024	Academic year of realisation of subject	2026/2027
Education level	first-cycle studies	Subject group	Obligatory subject group in the field of study 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	3.0
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 inż. Jacek Zawalich	
	Teachers		

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	15.0	15.0	15.0	0.0	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	6.0	24.0	75

Subject objectives

The aim of the course is to provide theoretical and practical knowledge in the field of construction, design and servicing of automated hydrogen installations in industrial conditions using computer hardware and engineering software.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_U07] can build and analyze models of systems and systems in the field related to hydrogen devices and installations as well as control and automation systems	The student is able to solve tasks in the field of design, modeling and simulation of devices and control systems for hydrogen installations. The student is comfortable using simulation programs for modeling specific objects and control systems.	[SU1] Assessment of task fulfilment [SU4] Assessment of ability to use methods and tools
[K6_W16] has knowledge of the current state and the latest development trends related to the field of study.	The student knows current development trends in the power system.	[SW1] Assessment of factual knowledge
[K6_W14] knows and understands at an advanced level the principles, methods and techniques of programming and the principles of creating computer software or programming devices or controllers using microprocessors or programmable elements or systems specific to the field of study, as well as the organization of the work of systems using computers or these devices	The student has the ability to use specific algorithms used in hydrogen technologies. The student develops programs to be implemented in PLC controllers or industrial computers.	[SW1] Assessment of factual knowledge [SW3] Assessment of knowledge contained in written work and projects
[K6_K02] can work in a group taking on different roles in it	The student is able to cooperate with other members of the laboratory group.	[SK1] Assessment of group work skills

<table>
<tr><td>Subject contents</td><td>LECTURE
Structures of control systems for hydrogen installations and the technical processes occurring in them. Examples of industrial systems and facilities with hydrogen installations. Types of industrial measuring, actuating and control devices, their selection and basic characteristics. Methods of identification, modeling and simulation of facilities with hydrogen installations. Power system automation. Design of hydrogen storage and transport equipment. Hydrogen technologies in the chemical industry. Automation of components in hydrogen installations.

LABORATORY
Designing control and monitoring systems for automated energy systems, based on programmable controllers and a visualization system. Analysis of the operation of the selected system, technical assumptions, defining the functions implemented in the programmable controller and visualization systems, control algorithms, technical documentation.

EXERCISES
Mathematical methods for analyzing and designing automation elements and systems used in systems with hydrogen technologies. Methods of selecting the measuring and executive equipment used.</td></tr>
<tr><td>Prerequisites and co-requisites</td><td>Knowledge of the Fundamentals of Automation</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>Laboratory</td><td>100.0%</td><td>20.0%</td></tr>
<tr><td>Excercise</td><td>50.0%</td><td>20.0%</td></tr>
<tr><td>Lecture</td><td>60.0%</td><td>60.0%</td></tr>
</table></td></tr>
<tr><td>Recommended reading</td><td><table>
<tr><td>Basic literature</td><td>1. Findeisen W.: Technika regulacji automatycznej. Warszawa: PWN 1976.
2. Kaczorek T.: Teoria układów regulacji automatycznej, Warszawa: WNT 1979.
3. Tatjewski P.: Sterowanie zaawansowane obiektów przemysłowych. Struktury i algorytmy. Warszawa: EXIT 2002.
4.Winkler W., Wiszniewski A.: Automatyka zabezpieczeniowa w systemach elektroenergetycznych. WNT, Warszawa 2004.
5. Piegat A.: Modelowanie i sterowanie rozmyte. Warszawa: EXIT 1999.
6. Ogata K.: Modern Control Engineering. 4th edition. Prentice Hall 2002.</td></tr>
<tr><td>Supplementary literature</td><td>1. Próchnicki W., Dzida M.: Zbiór zadań z podstaw automatyki. Gdańsk: Wyd. PG 1993.
3. Raven F.H.: Automatic Control Engineering. McGraw-Hill 1988.
4. Dokumentacja techniczna: Programowalny sterownik S7-1200 Podręcznik systemu. Wydanie 04/2009.</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>Analyze the pressure regulation system in the hydrogen tank.
Design a control system for a hydrogen storage installation.
Develop alarm algorithms in the hydrogen installation control system.</td></tr>
<tr><td>Work placement</td><td>Not applicable</td></tr>
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