



Subject card

Subject name and code	Automatics and control, PG_00058359						
Field of study	Hydrogen Technologies and Electromobility						
Date of commencement of studies	October 2023	Academic year of realisation of subject			2025/2026		
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_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		
	[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.			[SW3] Assessment of knowledge contained in written work and projects [SW1] Assessment of factual knowledge		
	[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_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.			[SU4] Assessment of ability to use methods and tools [SU1] Assessment of task fulfilment		

Subject contents	<p><b>LECTURE</b> 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.</p> <p><b>LABORATORY</b> 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.</p> <p><b>EXERCISES</b> 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.</p>														
Prerequisites and co-requisites	Knowledge of the Fundamentals of Automation														
Assessment methods and criteria	<table border="1" data-bbox="448 663 1489 801"> <thead> <tr> <th data-bbox="448 663 794 696">Subject passing criteria</th> <th data-bbox="794 663 1141 696">Passing threshold</th> <th data-bbox="1141 663 1489 696">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="448 696 794 730">Lecture</td> <td data-bbox="794 696 1141 730">60.0%</td> <td data-bbox="1141 696 1489 730">60.0%</td> </tr> <tr> <td data-bbox="448 730 794 763">Excercise</td> <td data-bbox="794 730 1141 763">50.0%</td> <td data-bbox="1141 730 1489 763">20.0%</td> </tr> <tr> <td data-bbox="448 763 794 801">Laboratory</td> <td data-bbox="794 763 1141 801">100.0%</td> <td data-bbox="1141 763 1489 801">20.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	Lecture	60.0%	60.0%	Excercise	50.0%	20.0%	Laboratory	100.0%	20.0%
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Recommended reading	Basic literature	<ol style="list-style-type: none"> <li>1. Findeisen W.: Technika regulacji automatycznej. Warszawa: PWN 1976.</li> <li>2. Kaczorek T.: Teoria układów regulacji automatycznej, Warszawa: WNT 1979.</li> <li>3. Tatjewski P.: Sterowanie zaawansowane obiektów przemysłowych. Struktury i algorytmy. Warszawa: EXIT 2002.</li> <li>4. Winkler W., Wiszniewski A.: Automatyka zabezpieczeniowa w systemach elektroenergetycznych. WNT, Warszawa 2004.</li> <li>5. Piegat A.: Modelowanie i sterowanie rozmyte. Warszawa: EXIT 1999.</li> <li>6. Ogata K.: Modern Control Engineering. 4th edition. Prentice Hall 2002.</li> </ol>													
	Supplementary literature	<ol style="list-style-type: none"> <li>1. Próchnicki W., Dzida M.: Zbiór zadań z podstaw automatyki. Gdańsk: Wyd. PG 1993.</li> <li>3. Raven F.H.: Automatic Control Engineering. McGraw-Hill 1988.</li> <li>4. Dokumentacja techniczna: Programowalny sterownik S7-1200 Podręcznik systemu. Wydanie 04/2009.</li> </ol>													
	eResources addresses	Adresy na platformie eNauczanie:													
Example issues/ example questions/ tasks being completed	<p>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.</p>														
Work placement	Not applicable														