



## Subject card

Subject name and code	Automatics and control of technical processes, PG_00057710						
Field of study	Green Technologies						
Date of commencement of studies	October 2022		Academic year of realisation of subject		2024/2025		
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	5		ECTS credits		6.0		
Learning profile	general academic profile		Assessment form		assessment		
Conducting unit	Department of Process Engineering and Chemical Technology -> Faculty of Chemistry						
Name and surname of lecturer (lecturers)	Subject supervisor		dr inż. Bartosz Szulczyński				
	Teachers		dr inż. Bartosz Szulczyński				
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	15.0	30.0	0.0	0.0	75
	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	75		15.0		60.0	150
Subject objectives	To familiarize students with the basic concepts of control and automatic regulation of operations processes of the chemical industry. Presentation of the possibility of application of mathematical description of fluid flow and heat transfer for analysis of non-transient states of processes. Overview of the principle of operation and use of sensors and measuring instruments for controlling basic process parameters in the chemical industry						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K6_W03] has a basic knowledge of soil, air and water pollutants, design and supervision of environmentally friendly technologies and technologies which do not produce waste, knows technology of cleaning and neutralization of industrial waste and wastewater management, has a basic understanding of the theoretical basis of methods and types of apparatus used in chemical analysis of environmental pollutants	The student has basic knowledge of the control and supervision of technological processes and the methods and types of chemical sensors used in the analysis of environmental pollution.	[SW1] Assessment of factual knowledge
	[K6_K04] is ready to think and act in a creative and enterprising way, to negotiate, work in a team, assuming different roles	The student is able to creatively use the acquired knowledge in the field of automation and control of technological processes.	[SK1] Assessment of group work skills
	[K6_U05] can formulate and solve engineering tasks analytical methods, simulation as well as experimental, able to apply knowledge of basic physics and mathematics to analyze the results of experiments, is able to analyze and assess existing technical solutions	The student is able to apply the acquired knowledge in the field of automation and control of technological processes, combining it with knowledge of the basics of physics and mathematics.	[SU2] Assessment of ability to analyse information [SU4] Assessment of ability to use methods and tools
	[K6_U03] is able to use information and communication technologies relevant to the common tasks of engineering, is able to use known methods and mathematical-physical models to describe and explain phenomena and chemical processes	The student is able to use information and communication technologies and is able to use the knowledge acquired	[SU4] Assessment of ability to use methods and tools [SU3] Assessment of ability to use knowledge gained from the subject [SU2] Assessment of ability to analyse information
	[K6_W06] has a basic knowledge of chemical engineering, mechanical engineering and chemical equipment, knows and understands basic processes taking place in green, proenvironmental technologies	The student has basic knowledge in the field of technical sciences and technological processes	[SW3] Assessment of knowledge contained in written work and projects [SW2] Assessment of knowledge contained in presentation
Subject contents	Concepts and basic quantities. Feedback, adjustment and control systems. Block diagrams. Basic principles of mathematical description of dynamic properties of regulating elements. States determined and undetermined processes. Adjustment of control and regulation of processes - regulators and actuators. Methods of investigation and analysis of transient states of processes. Selection of regulators. Stability and quality of control. Criteria for assessing quality of regulation. Types of regulation. Measurement of basic process parameters. Temperature measurement and control, thermometers, construction, principle of operation. Thermometric sensor dynamics. Pressure measurement, construction and principle of operation of manometers. Measurement of volume of liquid volume flow, liquid level, density, viscosity, humidity.		
Prerequisites and co-requisites	Movement of electrical charges, hydrostatic and hydrodynamics, heat transfer, physical quantities, basic units, basic concept of differential calculus		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	lecture	60.0%	70.0%
	lab	60.0%	30.0%
Recommended reading	Basic literature	There is no requirement	
	Supplementary literature	There is no requirement	
	eResources addresses	Adresy na platformie eNauczanie:	
Example issues/ example questions/ tasks being completed	Task 1. Determine the flow rate of dry air at 20 ° C, if the measuring orifice with 100 mm bore diameter installed in the DN200 pipeline, the pressure difference indicated by the differential transducer is 216 mbar. An expansion number of 0.85 should be assumed. Task 2. Determine the pressure difference indicated by the Pitot tube fitted on a plane flying at a speed of 460 km · h-1 at a cruising altitude of 10,000 m (t = -50 ° C, p = 197 mmHg). Task 3. Methane gas under a pressure of 2 bar at 32 ° C flows through the rotameter. The rotameter is scaled relative to air (20 ° C, 760 mmHg). The float indicates 200 dm3h-1. Determine the actual value of the methane flow rate.		
Work placement	Not applicable		

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