



Subject card

Subject name and code	Automatics and Measurement of Physical Quantity, PG_00048555						
Field of study	Chemical Technology						
Date of commencement of studies	October 2022	Academic year of realisation of subject			2023/2024		
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	2	Language of instruction			Polish		
Semester of study	3	ECTS credits			4.0		
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 hab. inż. Jacek Gębicki				
	Teachers						
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	30.0	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	2.0	53.0	100		
Subject objectives	The student should identify the elements of the regulation system, understand the principles of their operation and interaction, and know the methods for measuring physicochemical quantities.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	K6_W10						
	K6_U10						
	K6_U04		The student acquires basic knowledge in the field of designing selected unit processes		[SU4] Assessment of ability to use methods and tools [SU2] Assessment of ability to analyse information [SU1] Assessment of task fulfilment		
K6_W04		The student is able to analyze the occurring technological processes and correctly conclude		[SW3] Assessment of knowledge contained in written work and projects [SW2] Assessment of knowledge contained in presentation			
Subject contents	Basic concepts and quantities. Feedback, regulation and control systems. Block diagrams. Basics of mathematical description of dynamic properties of control system components. Steady and transient states of processes. Setting up control and regulation of processes - regulators and actuators. Methods of testing and analysis of transient processes. Selection of regulators. Stability and quality of control. Criteria for assessing the quality of regulation. Types of regulation. Measurements of basic process parameters. Temperature measurement and regulation, thermometric sensors, construction, principle of operation. Dynamics of thermometric sensors. Pressure measurement, construction and principle of manometers. Measurement of the volume flow rate of liquids, liquid level, density, viscosity, humidity.						
Prerequisites and co-requisites	Movement of electric charges, hydrostatics, heat movement, physical quantities, units, basic concepts of differential calculus						
Assessment methods and criteria	Subject passing criteria		Passing threshold		Percentage of the final grade		
	laboratory		60.0%		30.0%		
	lecture		60.0%		70.0%		

Recommended reading	Basic literature	<p>1. W. Grebliński: Podstawy automatyki, Oficyna Wydawnicza Politechniki Wrocławskiej, Wrocław 2006,</p> <p>2. Automatyka i robotyka podstawy, Wydawnictwo PG, Gdańsk 2003,</p> <p>3. D. Taler, J. Sokołowski: Pomiary cieplne w przemyśle, Agenda Wydawnicza PAK, Warszawa 2006,</p> <p>4. M.W. Kułakow: Pomiary technologiczne i aparatura kontrolno pomiarowa w przemyśle chemicznym, WNT, Warszawa 1972,</p> <p>5. E. Romer: Miernictwo przemysłowe, WNT, Warszawa.</p>
	Supplementary literature	Not applicable
	eResources addresses	
Example issues/ example questions/ tasks being completed	<p>For a tank with a volume of 2 m³ and a height of 0.8 m, the Z1 valve is connected to process water at a rate of 0.5 l / s, the Z2 valve is drained at a rate of 0.2 l / s. The level sensor switches off the Z1 valve when the liquid level in the tank reaches 0.6 m ± 0.05. Assume that the transmittance of an object is described by the dependence:</p> $G_o(s) = (3/12s + 1) * \exp(-3s)$ <p>designate:</p> <ol style="list-style-type: none"> 1. difficulty level of regulation (if applicable), 2. choosing the right regulator, 3. system stability 	
Work placement	Not applicable	