



## Subject card

Subject name and code	Automatics and Measurement of Physical Quantity, PG_00060849						
Field of study	Chemical Technology						
Date of commencement of studies	October 2023	Academic year of realisation of subject			2024/2025		
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			3.0		
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 dr inż. Piotr Rybarczyk					
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	5.0		40.0	90	
Subject objectives	Discussion of the operating principle and application of sensors and measuring devices for controlling basic process parameters in the chemical industry. Presentation of the possibilities of using the mathematical description of fluid flow and heat transfer to analyze unsteady states of processes. Familiarization of students with basic concepts related to control, steering and automatic regulation of chemical industry process operations.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K6_U04] performs basic design calculations of selected processes and unit operations, is able to calculate and select the basic apparatus of chemical industry in a process line	Student is able to perform basic design and technological calculations	[SU1] Assessment of task fulfilment
	[K6_W10] Has knowledge in the areas of electrical engineering, electronics, automation and computer science. He knows the principles of operation of control and measurement systems and electronic control systems	Student has knowledge of control, measurement and control devices used in the chemical and related industries.	[SW3] Assessment of knowledge contained in written work and projects
	[K6_U10] is able to select elements of automatic control systems for simple technological processes. Is able to use computer programmes supporting the implementation of tasks typical of control and optimisation of chemical processes	Student is able to select elements of automatic control systems and use specialized software to optimize chemical processes.	[SU3] Assessment of ability to use knowledge gained from the subject [SU4] Assessment of ability to use methods and tools
	[K6_W04] understands processes occurring in the life cycle of equipment and facilities and has knowledge of mechanical engineering, chemical apparatus, technical thermodynamics and chemical engineering and chemical reactor engineering necessary to analyse technological processes and correctly design installations and systems in the chemical industry	Student has the technical knowledge necessary to analyze technological processes and design chemical industry installations.	[SW1] Assessment of factual knowledge
Subject contents	Basic concepts and quantities. Feedback, regulation and control systems. Block diagrams. Basics of mathematical description of dynamic properties of control system elements. Steady and transient states of processes. Control setting and process regulation - controllers and executive devices. Methods of testing and analyzing transient states of processes. Selection of controllers. Stability and quality of control. Criteria for assessing the quality of regulation. Types of regulation. Measurements of basic process parameters. Temperature measurement and control, thermometric sensors, construction, principle of operation. Dynamics of thermometric sensors. Pressure measurement, construction and principle of operation of manometers. Measurement of the volume flow of fluids, liquid level, density, viscosity, humidity.		
Prerequisites and co-requisites	Movement of electric charges, hydrostatics and hydrodynamics, heat movement, physical quantities, basic units, basic concepts of differential calculus		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Lecture Test	60.0%	70.0%
	Lab test	60.0%	30.0%
Recommended reading	Basic literature	1. Dunn William: Fundamentals of Industrial Instrumentation and Process Control,  2. Gregory K. Mcmillan, P. Hunter Vegas: Process / Industrial Instruments and Controls Handbook  3. Dale R. Patrick;Stephen W. Fardo: Industrial Process Control Systems  4. Katariya Sanjay B: Industrial Automation Solutions for Plc, Scada, Drive and Field Instruments: Easy to Learn Industrial Automation	
	Supplementary literature	There are no requirements	
	eResources addresses	Adresy na platformie eNauczenie: Automatyka i pomiary wielkości fizykochemicznych - Moodle ID: 42492 <a href="https://enauczenie.pg.edu.pl/moodle/course/view.php?id=42492">https://enauczenie.pg.edu.pl/moodle/course/view.php?id=42492</a>	
Example issues/ example questions/ tasks being completed	1. The first-order inertial object transfer function has the form 2. Describe the Hurwitz stability criterion 3. Determine the Laplace transform of the given function 4. Determine the dependence of the signal on the measured quantity for resistive temperature sensors		

Work placement	Not applicable
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