



Subject card

Subject name and code	, PG_00037575						
Field of study	Green Technologies						
Date of commencement of studies	October 2020	Academic year of realisation of subject			2022/2023		
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			English		
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	0.0	30.0	0.0	0.0	60
	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	60	15.0		75.0	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_K03] turns the attention to the prestige associated with the profession and professional solidarity properly understood, shows respect for others and concern for their welfare	The student acquires the skill of caring for prestige associated with his profession in the future			[SK4] Assessment of communication skills, including language correctness [SK5] Assessment of ability to solve problems that arise in practice [SK2] Assessment of progress of work		
	[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 of chemical and process engineering and technological operations			[SW1] Assessment of factual knowledge [SW2] Assessment of knowledge contained in presentation		
	[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 techniques to solve tasks in the field of chemical engineering and chemical technology			[SU3] Assessment of ability to use knowledge gained from the subject [SU4] Assessment of ability to use methods and tools [SU2] Assessment of ability to analyse information		
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
	lab	60.0%	30.0%
	lecture	60.0%	70.0%
Recommended reading	Basic literature	There is no requirement	
	Supplementary literature	There is no requirement	
	eResources addresses	Adresy na platformie eNauczenie:	
Example issues/ example questions/ tasks being completed	<p>1. The dry air (20°C) flows through the DN200 pipeline. A flow measuring orifice with a hole diameter equal to 100 mm is mounted on the pipeline. Differential pressure sensor indicates value 216 mbar between the sides of the orifice. Determine the dry air flow rate in the pipeline.</p> <p>2. Determine the differential pressure indicated by the pitot tube mounted on an airplane flying at 460 km·h⁻¹ at a altitude of 10,000 m (t = -50°C, p = 197 mmHg).</p> <p>3. The gaseous methane flows through the rotameter at 2 bar & 32°C. The rotameter is calibrated to the air (20°C, 760 mmHg). The float indicates the value 200 dm³h⁻¹. Determine the actual value of the methane flow.</p>		
Work placement	Not applicable		