GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	, PG_00037575		
Field of study	Green Technologies		
Date of commencement of studies	October 2021	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	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_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 describe the automatic control system mathematically, Isisresent the responses of automation objects to selected input signals, knows the rules for selecting the type of regulation, setting controller parameters and determining regulation quality criteria.	[SU3] Assessment of ability to use knowledge gained from the subject [SU4] Assessment of ability to use methods and tools
[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 knows: basic types of measurement sensors used in the chemical and related industries; basic signals and automation objects. The student is able to create a block diagram of an automatic control system, determine the time constant of an object and determine the metrological parameters of sensors.	[SW3] Assessment of knowledge contained in written work and projects [SW1] Assessment of factual knowledge
[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	[SK5] Assessment of ability to solve problems that arise in practice [SK3] Assessment of ability to organize work

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 eNauczanie: Automatics and control of technical processes 2023 - Moodle ID: 34478 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=34478

Example issues/ example questions/ tasks being completed

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.

2. Determine the differential pressure indicated by the pitot tube mounted on an airplane flying at 460 $km \cdot h^{-1}$ at a altitude of 10,000 m (t = -50°C, p = 197 mmHg).

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 dm^3h^{-1}. Determine the actual value of the methane flow.

Work placement	Not applicable