GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Automatics and Control of technical processes, PG_00036284		
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	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	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_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 technical sciences and technological processes	[SW2] Assessment of knowledge contained in presentation [SW3] Assessment of knowledge contained in written work and projects
[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 and is able to use the acquired knowledge	[SU2] Assessment of ability to analyse information [SU3] Assessment of ability to use knowledge gained from the subject [SU4] Assessment of ability to use methods and tools
[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 ability to care 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

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.

<table>
<tr><td>Prerequisites and co-requisites</td><td colspan="3">Movement of electrical charges, hydrostatic and hydrodynamics, heat transfer, physical quantities, basic units, basic concept of differential calculus</td></tr>
<tr><td>Assessment methods and criteria</td><td colspan="3"><table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>lab</td><td>60.0%</td><td>30.0%</td></tr>
<tr><td>lecture</td><td>60.0%</td><td>70.0%</td></tr>
</table></td></tr>
<tr><td rowspan="3">Recommended reading</td><td>Basic literature</td><td colspan="2">1. Stamatios Manesis, George Nikolakopoulos, Introduction to Industrial Automation, CRC Press

2. Jacob Fraden, Handbook of Modern Sensors, Springer 2010</td></tr>
<tr><td>Supplementary literature</td><td colspan="2">There is no requirement</td></tr>
<tr><td>eResources addresses</td><td colspan="2">Adresy na platformie eNauczanie:</td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td colspan="3">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.</td></tr>
<tr><td>Work placement</td><td colspan="3">Not applicable</td></tr>
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