GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Process apparatus in environmental protection, PG_00064850		
Field of study	Mechanical Engineering		
Date of commencement of studies	February 2025	Academic year of realisation of subject	2025/2026
Education level	second-cycle studies	Subject group	Specialty subject group 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	1	Language of instruction	Polish
Semester of study	2	ECTS credits	2.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Department of Energy and Industrial Apparatus -> Faculty of Mechanical Engineering and Ship Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Bartosz Dawidowicz	
	Teachers		

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	15.0	0.0	0.0	15.0	0.0	30

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	30	5.0	15.0	50

Subject objectives

Teaching the basics of construction and calculation of typical devices from process apparatus used in environmental protection. Indication of the specificity of devices in this application. Providing the methodology for calculating the dimensions of selected elements of the installation.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_W13] explains the main principles of individual and teamwork organization, including various forms of entrepreneurship utilizing knowledge from the field of engineering and technical sciences and disciplines relevant to the course of study	Student posiada wiedzę z zakresu aparatury procesowej w ochronie środowiska.	[SW1] Assessment of factual knowledge
[K7_W04] demonstrates knowledge covering selected topics of advanced specific knowledge, in particular methods, techniques, tools specific to Mechanics and Mechanical Engineering processes, systems and equipment	The student is able to calculate the basic dimensions of selected devices and apparatus used in environmental protection.	[SW3] Assessment of knowledge contained in written work and projects [SW1] Assessment of factual knowledge
[K7_U15] evaluates the feasibility of advanced methods and tools for solving complex engineering tasks of a practical nature, characteristic of the field of study, and selects and applies appropriate methods and tools for this purpose	The student is able to design a device using engineering tools.	[SU1] Assessment of task fulfilment

Subject contents

Lecture.Concepts of process apparatus and environmental protection engineering. Overview of the elements and equipment of the apparatus. Construction materials used in the construction of process apparatus. Selected issues of process equipment, including REACTORS. General concepts, classification, their place in environmental protection. Technological operations carried out in reactors: mixing, air injection, circulation of the reactor contents. Periodic and flow reactors. Ideal and real reactors. Dynamic characteristics. Cascade. Types of flows in reactors. Aeration systems. Construction of diffusers. Mixing power, examples of mixers used in reactors. TANKS FOR WASTEWATER. Construction. Basics of calculations. Apparatus used for secondary and subsequent treatment of sewage. SEALS. Stabilization. Thickening. Drainage. Basics of device construction. Other examples of process equipment in environmental protection. DESIGN. Selected issues in the design of apparatus, eg: the basics and methods of dimensioning the treatment plant. Selected processes in environmental protection

<table>
<tr><td>Prerequisites and co-requisites</td><td colspan="3">basics of physics, chemistry, fluid mechanics and wastewater treatment</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>Exam from the lecture</td><td>56.0%</td><td>50.0%</td></tr>
<tr><td>Grade of the project</td><td>56.0%</td><td>50.0%</td></tr>
</table></td></tr>
<tr><td rowspan="3">Recommended reading</td><td>Basic literature</td><td colspan="2">1. Warych J.: Apararura chemiczna i procesowa, Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 1996

2. Vesilind A., Peirce J.J., Weiner R.: Environmental engineering. Butterworth Publishers, Stoneham, 1988.

3. Łomotowski J., Szpindor A.: Nowoczesne systemy oczyszczania ścieków. Arkady, W-wa, 1999.

4. Grandison A.S., Lewis M.J.: Separation processes in the food and biotechnology Industries. Woodhead Publishing Ltd., Cambridge, 1996.

5. Ciborowski J.: Inżynieria procesowa. WNT, W-wa, 1965.</td></tr>
<tr><td>Supplementary literature</td><td colspan="2">1. Pikoń J.: Aparatura chemiczna. PWN, W-wa, 1978.

2. Wodociągi - Kanalizacja. Abrys sp. z o.o., monthly</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">1. Real reactor.2. Discuss the structure and operation of a reactor with a biological bed.3. Purpose and methods of reactor aeration.</td></tr>
<tr><td>Work placement</td><td colspan="3">Not applicable</td></tr>
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