



Subject card

Subject name and code	Chemical apparatus, PG_00060845						
Field of study	Chemical Technology						
Date of commencement of studies	October 2026	Academic year of realisation of subject				2026/2027	
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	1	Language of instruction				Polish	
Semester of study	2	ECTS credits				4.0	
Learning profile	general academic profile	Assessment form				exam	
Conducting unit	Department of Energy Conversion and Storage -> Faculty of Chemistry -> Faculties of Gdańsk University of Technology						
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Monika Wilamowska-Zawłocka					
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	0.0	15.0	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	50.0	100		
Subject objectives	This course teaches students about the classification of industrial processes, including mechanical, thermal, and diffusion processes, as well as the construction and operation of the corresponding apparatus. The course covers equations that describe fluid dynamics, such as Bernoulli's equation and the calculation of flow resistance, as well as the construction and function of machines and apparatus, such as pumps, pipelines, tanks, conveyors, grinding, separation and mixing equipment, heat exchangers, drying equipment, distillation, rectification, and mass exchange equipment.						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	[K6_U04] Is able to recognize and apply polymer processing methods, analyze corrosion processes of construction materials in the design of installations, taking into account systemic and non-technical aspects.	is able to analyze technological processes and industrial installations and, based on calculations and assumptions, select appropriate equipment and construction materials for various applications.			[SU1] Assessment of task fulfilment [SU3] Assessment of ability to use knowledge gained from the subject		
	[K6_U07] Is able to select and justify a chemical and technological production concept, assess the quality of products and analyse and evaluate existing technical solutions.	Based on the analysis of momentum, mass, and heat transport processes and the selection of process equipment, the student is able to design and justify the technological concept of selected unit operations in the chemical industry, assess the quality of the products obtained, and critically analyze and evaluate existing technical solutions.			[SU1] Assessment of task fulfilment [SU2] Assessment of ability to analyse information		
[K6_W04] Possesses the technical knowledge necessary to analyze processes and design installations in the chemical industry.	are familiar with the construction and operation of fundamental equipment used in chemical technology. Based on calculations, they are able to design an industrial installation and select suitable equipment for it.			[SW1] Assessment of factual knowledge [SW3] Assessment of knowledge contained in written work and projects			

Subject contents	<p>Course content – lecture</p> <ul style="list-style-type: none"> - Fluid dynamics - equations describing fluid dynamics, resistance to flow in pipelines. - Pipelines and auxiliary fittings for chemical processes - Pumps - standard and special pumps, their construction and use, pump seals - Compressors and fans - Bulk material handling - conveyors - Storage tanks - materials and construction elements of tanks depending on the type of substance stored - Mixing processes in the chemical industry, construction of mixers, types of mixers, mixing efficiency mixing efficiency and ways of eliminating whirls - Grinding processes - construction of equipment and energy consumption of processes depending on the required degree of comminution - Separation of heterogeneous systems - Heat transfer - coefficients of heat penetration, conduction and transfer, heat exchangers, evaporators, crystallisers evaporators, crystallisers, dryers. - Mass transfer - adsorption and absorption columns - Distillation and rectification 		
	<p>Course content – project</p> <p>Fluid dynamics calculations calculating flow resistance in pipelines, selecting pipeline diameters based on permissible pressure drops and flow rates. Calculating the pressure that a pump must generate in a sample technological installation. Selecting a pump based on calculations of the pressure required in the installation at a specified operating capacity.</p> <p>Design tasks involving calculations needed to select the appropriate equipment for a technological installation and selecting equipment from the manufacturer's catalog.</p>		
Prerequisites and co-requisites	Basic knowledge of mathematics, physics, chemistry, technical drawing, mechanical engineering, computer skills.		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Lectures - exam	60.0%	60.0%
	Project - calculation test, project assignments	60.0%	40.0%
Recommended reading	Basic literature	<ol style="list-style-type: none"> 1. Błasiński H., Młodziński B., - Aparatura przemysłu chemicznego, WNT 1983, 2. Pikoń J., - Aparatura chemiczna, PWN 1978, 3. J. Warych, Aparatura Chemiczna i Procesowa, Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 1996 4. Bieszk H., Urządzenia do realizacji procesów mechanicznych w technologii chemicznej, Wyd. PG. 2001, 5. Bieszk H., Urządzenia do realizacji procesów cieplnych w technologii chemicznej, Wyd. PG. 2010, 6. Pawłowski K.F., Romankow P.G., Noskow A.A. - Przykłady i zadania z zakresu aparatury i inżynierii chemicznej, WNT 1981 	
	Supplementary literature	<ol style="list-style-type: none"> 1. Goździcki M., Świątkiewicz H., Przenośniki. WNT, Warszawa 1979, 2. Koch R., Noworyta A.: Procesy mechaniczne w inżynierii chemicznej. WNT, Warszawa 1992, 3. Leszczyński S.: Filtracja w przemyśle chemicznym. WNT, Warszawa 1972, 4. Stępniewski M.: Pompy. WNT, Warszawa 1985 	
	eResources addresses		
Example issues/ example questions/ tasks being completed	<p>Sample questions:</p> <p>List and describe the differences between positive displacement pumps and centrifugal pumps.</p> <p>Why are pumps connected in series/parallel?</p> <p>How can the capacity of a centrifugal/piston pump be adjusted?</p> <p>Give examples of special purpose fittings in pipelines.</p> <p>List the methods of cleaning pipelines.</p> <p>How do you reduce/eliminate circular motion in mixers?</p> <p>State the device(s) best suited for separating a liquid-liquid-solid three-phase system.</p> <p>solid.</p> <p>Why are heat exchangers combined in a series/parallel system?</p> <p>Why are evaporative apparatuses combined into batteries?</p> <p>What is the role of the overflow on the shelf of the rectification column?</p>		
Practical activities within the subject	Not applicable		

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