



Subject card

Subject name and code	THEORY OF MACHINES AND APPARATUS, PG_00064379						
Field of study	MASZYNOZNAWSTWO I APARATURA CHEMICZNA						
Date of commencement of studies	October 2025		Academic year of realisation of subject		2025/2026		
Education level	first-cycle studies		Subject group		Obligatory subject group 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		5.0		
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. Katarzyna Januszewicz				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	0.0	30.0	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		5.0		60.0	125
Subject objectives	Familiarizing the student with technical and engineering topics such as technical drawing, strength of materials, construction materials, and machine and apparatus components commonly used in the chemical industry. Gaining knowledge of the operating principles and design of equipment applied in industry, particularly in the chemical sector. Learning about technological installations, acquiring the ability to select an appropriate pump for a system, and performing basic engineering calculations related to stresses in a given system as well as the characteristics of fluids and flow processes.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K6_U08] applies computer-aided, common methods, chemical apparatus and tools necessary for the solution of simple engineering tasks involving for example technological processes, with a preliminary economic analysis of the engineering activities undertaken	The student is able to select an appropriate pump for a given installation. They can use standards relevant to the topics discussed and can identify the basic components of technical installations in technical drawings.	[SU1] Ocena realizacji zadania [SU2] Ocena umiejętności analizy informacji
	[K6_W05] recognises methods, techniques and tools of computer aided design for solving engineering tasks in chemistry, chemical engineering and technology, mechanical engineering, in the design and analysis of technological processes	The student recognizes equipment in technical drawings and is able to describe its construction and operating principle.	[SW2] Ocena wiedzy zawartej w prezentacji [SW1] Ocena wiedzy faktograficznej
	[K6_K04] is able to identify and resolve dilemmas related to the chemical engineering profession while respecting traditions and ethical principles	The student is able to assign the appropriate types of stresses and theoretical concepts to potential failures or structural disasters of construction elements.	[SK2] Ocena postępów pracy
	[K6_U06] analyses the operation of equipment, apparatus and process lines used in laboratories and the chemical industry	The student identifies the five basic types of mechanical stresses used in engineering (tensile, compressive, shear, buckling, and bearing stresses). They classify, describe, and draw the fundamental joints used in the chemical industry. The student calculates the basic dimensions of vessel or installation components. They recognize the main types of valves and fittings used in chemical industry systems. The student is familiar with the classification of construction materials applied in the design of chemical process installations.	[SU1] Ocena realizacji zadania
Subject contents	<p>Course content – lecture</p> <p>Principles of preparing and reading technical drawings, diagrams, and technical documentation; selected topics in mechanics, statics, and strength of materials, including tension, compression, pressure, shear, and vessel strength; joints used in the construction of equipment and apparatus in the chemical industry, such as threads, welds, rivets, and others; an overview of construction materials used in the chemical industry, including metals (ferrous and non-ferrous), natural materials (wood, leather, cork, rubber), and synthetic materials (ceramics, glass, plastics); discussion of the design and operating principles of components used in chemical industry installations, including tanks, valves, liquid level indicators, sight glasses, measurement points, mixers, etc.; presentation of material-handling equipment such as mechanical, pneumatic, and hydraulic conveyors, as well as mixers; heat-exchange apparatus (non-separating heat exchangers, recuperators, and regenerators); crushing and screening equipment (crushers, jaw breakers, roller mills, mills, disintegrators); apparatus and devices for the distribution of heterogeneous mixtures, including gas dedusting and suspension separation; and pumps.</p> <p>Course content – project</p> <p>Calculation tasks covering various types of stresses (tensile, compressive, bearing, shear, and buckling) as well as topics related to chemical process equipment (pump selection, types of flow in pipelines). The project involves calculations associated with selecting an appropriate vessel and pump for a given system.</p>		
Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Project	60.0%	20.0%
	Test	60.0%	50.0%
	Exam	60.0%	30.0%

Recommended reading	Basic literature	<p>Praca zbiorowa, Mały Poradnik Mechanika t.I i II, WNT, Warszawa, 1988,</p> <p>W.Lewandowski, Maszynoznawstwo chemiczne, Ćwiczenia projektowe, Wyd. PG., 1979,</p> <p>W.Lewandowski, A.Melcer, Zadania z maszynoznawstwa chemicznego, Wyd.PG, 2011.</p> <p>W.Lewandowski, Maszynoznawstwo chemiczne, Ćwiczenia projektowe, Wyd. PG., 1979,</p> <p>W.M.Lewandowski, Notatki z wykładów,</p> <p>W.Lewandowski, Techniczno-technologiczne i aparaturowe aspekty ochrony powietrza, Wyd.PG.Gdańsk, 2011</p> <p>J.Pikoń, Podstawy konstrukcji aparatury chemicznej , cz.1, PWN, Warszawa, 1979</p> <p>J.Pikoń, Aparatura chemiczna, PWN, Warszawa, 1978</p> <p>J.Pikoń,Atlas konstrukcji aparatury chemicznej, PWN, Warszawa, 1987</p>
	Supplementary literature	<p>W.Lewandowski Materiały pomocnicze do projektowania zbiornika, Strona domowa Katedry,</p> <p>(http://www.pg.gda.pl/chem/Katedry/Maszyny/masz_index.html)</p>
	eResources addresses	
Example issues/ example questions/ tasks being completed	Tasks involving vessels (wall thickness), the diameter of a screw conveyor, flange connections, and internal pressure in a tank. Calculations related to the practical application of the Bernoulli equation and the continuity equation. Pump selection and the design of a pipeline installation.	
Practical activities within the subject	Not applicable	

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