



Subject card

Subject name and code	, PG_00052340						
Field of study	Chemical Technology						
Date of commencement of studies	October 2020	Academic year of realisation of subject			2021/2022		
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	2	Language of instruction			Polish		
Semester of study	3	ECTS credits			4.0		
Learning profile	general academic profile	Assessment form			assessment		
Conducting unit	Department of Energy Conversion and Storage -> Faculty of Chemistry						
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Monika Wilamowska-Zawłocka					
	Teachers	dr hab. inż. Monika Wilamowska-Zawłocka					
Lesson types and methods of instruction	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						
	Address on the e-learning platform: https://enauczanie.pg.edu.pl/moodle/course/view.php?id=19105 Adresy na platformie eNauczanie:						
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	Student learns about the classification of industrial processes (mechanical, thermal and diffusion) as well as about construction and operation of devices for their implementation. The equations describing fluid dynamics (e.g. Bernoulli equation and calculating resistance to flow) will be discussed. Moreover, the construction and function of machines and apparatus such as pumps, pipelines, tanks, conveyors, grinding machines, apparatus for separation and mixing processes, heat exchangers, drying, distillation, rectification and mass transfer devices will be presented.						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	K6_W04	A student knows the construction and operation of necessary equipment used in chemical technology. Based on calculations, a student can design industrial installations and choose the appropriate equipment for it.			[SW1] Assessment of factual knowledge		
	K6_U04	A student knows technological processes and industrial installations. Based on calculations and assumptions, he can select the right device and construction material for various chemical substances.			[SU1] Assessment of task fulfilment [SU2] Assessment of ability to analyse information		
Subject contents	The content of the classes includes the presentation of necessary information relating to construction and operational principles of conventional machines and apparatuses generally applied in the chemical industries. The lecture covers discussion of the relations between the theory of devices operation and their construction supplemented with drawings. The intention is to give sufficient theoretical matter to provide the student with a satisfactory understanding of the subjects discussed.						
Prerequisites and co-requisites	Preliminary requirements: basic knowledge of: Mathematics, Physics, Chemistry, Engineering Graphics, Operational Use of Computer.						

Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Written tests, project work, written exam	60.0%	40.0%
	Written exam	60.0%	60.0%
Recommended reading	Basic literature	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. Pawłow K.F., Romankow P.G., Noskow A.A. - Przykłady i zadania z zakresu aparatury i inżynierii chemicznej, WNT 1981.	
	Supplementary literature	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, 5. Viesturs U.E., Szmita I.A., Żilewicz A.W., - Biotechnologia, WNT 1992.	
	eResources addresses		

<p>Example issues/ example questions/ tasks being completed</p>	<p>Issues discussed:</p> <ul style="list-style-type: none"> - Fluid dynamics - equations describing fluid dynamics, flow resistance in pipelines. - Pipelines and pipeline armature for chemical processes - Pumps - standard and special pumps, their construction and application, pump sealing - Compressors and fans - Transport of materials - conveyors - Storage tanks - materials and components of containers depending on the type of substance stored - Mixing processes in the chemical industry, construction of mixers, types of mixers, mixing efficiency and methods of vortex elimination - Shredding processes - construction of equipment and energy consumption of operations depending on the required degree of fragmentation - Separation of heterogeneous systems - Heat exchange - heat transfer coefficients, heat exchangers, evaporators, crystallizers, dryers. - Mass exchange - adsorption and absorption columns - Distillation and rectification processes <p>Sample questions: List and describe the differences between displacement and centrifugal pumps. Why are the pumps connected in series / parallel? How can the capacity of a centrifugal / piston pump be adjusted? Give examples of special purpose valves/armature in pipelines. List a pipeline cleaning methods. Give examples of conveyors. Specify the device (s) best suited for separating a three-phase liquid-liquid-solid system. Why are heat exchangers connected in series / parallel? Why are evaporators often combined in series?</p>
<p>Work placement</p>	<p>Not applicable</p>