



Subject card

Subject name and code	Chemical and Biotechnological Apparatus, PG_00037487						
Field of study	Biotechnology						
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	4	ECTS credits			3.0		
Learning profile	general academic profile	Assessment form			exam		
Conducting unit	Department of Chemical Apparatus and Theory of Machines -> 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	15.0	0.0	0.0	45
	E-learning hours included: 0.0						
Aparatura Chemiczna i Biotechnologiczna - Moodle ID: 22847 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=22847							
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		3.0		27.0	75
Subject objectives	A 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, reactors, bioreactors, 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_W10		The student knows industrial processes and technological installations. Based on calculations, he can choose the appropriate apparatus for industrial installations.			[SW3] Assessment of knowledge contained in written work and projects	
	K6_U10		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.			[SU3] Assessment of ability to use knowledge gained from the subject [SU1] Assessment of task fulfilment	
	K6_U09		The student has knowledge about devices for the separation of liquid-liquid, liquid-solid and solid-gas systems used in the chemical and biotechnology industries.			[SU3] Assessment of ability to use knowledge gained from the subject [SU2] Assessment of ability to analyse information	
Subject contents	The content of the classes includes the presentation of basic information relating to construction and operational principles of typical machines and apparatuses generally applied in the chemical and biotechnological 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 exam	60.0%	60.0%
	Written tests, project work, written exam	60.0%	40.0%
Recommended reading	Basic literature	<p>1. Błasiński H., Młodziński B., - Aparatura przemysłu chemicznego, WNT 1983,</p> <p>2. Pikoń J., - Aparatura chemiczna, PWN 1978,</p> <p>3. Bieszk H., Urządzenia do realizacji procesów mechanicznych w technologii chemicznej, Wyd. PG. 2001,</p> <p>4. Bieszk H., Urządzenia do realizacji procesów cieplnych w technologii chemicznej, Wyd. PG. 2010,</p> <p>5. Pawłow K.F., Romankow P.G., Noskow A.A. - Przykłady i zadania z zakresu aparatury i inżynierii chemicznej, WNT 1981.</p> <p>6. Warych J., Aparatura Chemiczna i Procesowa, Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 1996</p>	
	Supplementary literature	<p>1. Goździecki M., Świątkiewicz H., Przenośniki. WNT, Warszawa 1979,</p> <p>2. Koch R., Noworyta A.: Procesy mechaniczne w inżynierii chemicznej. WNT, Warszawa 1992,</p> <p>3. Leszczyński S.: Filtracja w przemyśle chemicznym. WNT, Warszawa 1972,</p> <p>4. Stępniewski M.: Pompy. WNT, Warszawa 1985,</p> <p>5. Viesturs U.E., Szmita I.A., Żilewicz A.W., - Biotechnologia, WNT 1992.</p> <p>6. Heidrich Z., Witkowski A., Urządzenia do oczyszczania ścieków projektowanie przykłady obliczeń, Wydawnictwo "Seidel-Przywecki" Sp. z o. o. Warszawa 2015</p>	
	eResources addresses		
Example issues/ example questions/ tasks being completed			
Work placement	Not applicable		