GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	, PG_00052348		
Field of study	Chemical Technology		
Date of commencement of studies	October 2022	Academic year of realisation of subject	2024/2025
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	3	Language of instruction	Polish
Semester of study	6	ECTS credits	2.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Department of Process Engineering and Chemical Technology -> Faculty of Chemistry		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Jacek Gębicki	
	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	25.0	60

Subject objectives

To introduce students to the basic concepts related to the technological classification of reactors. Familiarization with the basic relationships used to calculate reactors. Description of ideal reactors. Shaping students' skills of basic calculations concerning the theory of reactors.

Learning outcomes

Course outcome	Subject outcome	Method of verification
K6_W04	The student has knowledge of the theory of chemical reactors and knows the principle of operation of the basic types of reactors in the chemical industry	[SW3] Assessment of knowledge contained in written work and projects
K6_U04	The student is able to perform basic calculations using the knowledge of design equations for various types of ideal reactors	[SU1] Assessment of task fulfilment [SU2] Assessment of ability to analyse information

Subject contents

Technological classification of reactors. Batch reactor. Flow reactor with perfect mixing. Plug flow reactor. Cascade of flow reactors with perfect mixing. Comparison of a cascade of reactors with perfect mixing with a plug flow reactor. Design of isothermal reactors with perfect mixing or plug flow. Influence of the transformation kinetics on the selection of the reactor type.

Prerequisites and co-requisites

Knowledge of issues related to the kinetics and equilibrium of chemical reactions as well as mass and heat transfer. Knowledge of subjects: Physical chemistry, Chemical apparatus.

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
project - test	60.0%	20.0%
project - project task	100.0%	20.0%
lecture - 2 test	60.0%	60.0%

Recommended reading

Basic literature

1. A. Burghardt, Bartelmus G., Inżynieria reaktorów chemicznych, PWN 2001.

2 J. Szarawara, J. Piotrowski: Podstawy teoretyczne technologii chemicznej, WNT 2010.

3. S. Kucharski, J. Głowiński: Podstawy obliczeń projektowych w technologii chemicznej, Oficyna Wydawnicza Politechniki Wrocławskiej, 2005

	Supplementary literature	1. B. Tabiś, W. Żukowski: Przykłady i zadania z zakresu inżynierii reaktorów chemicznych, Politechnika Krakowska 2000 2. K. Schmidt-Szałowski i in.: Technologia Chemiczna, PWN 2013
	eResources addresses	Adresy na platformie eNauczanie:
Example issues/ example questions/ tasks being completed	Task 1 In a tank with a useful capacity of 0.5 m3, equipped with a stirrer, the A+B=C reaction is carried out, where the initial concentration of component A is 0.05 kmol/m3, and the concentration of component B is twice as high. The rate constant is 0.09 m3/(kmol*h). Determine the degree of transformation A. Task 2 The conversion rate A=2P is described by the first-order kinetic equation (k=2.5 h). Determine the average residence time of the reaction mixture in a cascade of 4 identical reactors with perfect mixing if a conversion of a=0.9 is needed. What residence time would be necessary to achieve this degree of conversion in a single stirred reactor? Task 3 In a two-stage reactor cascade with a stirrer, the reaction A+B=C+D is carried out. The reaction follows second order kinetics, where k=0.25 dm3/(mol*min). The initial concentrations of the reactants are equal and amount to 0.1 m/dm3. The residence time in the cascade, necessary to achieve the conversion degree of 0.8, should be determined	
Work placement	Not applicable	

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