

。 GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Introduction to chemical engineering, PG_00062759							
Field of study	Technologies for Industry 5.0							
Date of commencement of studies	October 2024		Academic year of realisation of subject			2025/2026		
Education level	first-cycle studies		Subject group		Optional subject group 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			4.0		
Learning profile	general academic profile		Assessment form			assessment		
Conducting unit	Hydrogen Technolog	ies Center -> V	ice-Rector For	Development				
Name and surname	Subject supervisor		dr hab. inż. D	ż. Donata Konopacka-Łyskawa				
of lecturer (lecturers)	Teachers							
Lesson types and methods	Lesson type	Lecture	Tutorial	Laboratory	Projec	oject Seminar		SUM
of instruction	Number of study hours	15.0	0.0	15.0	15.0		0.0	45
	E-learning hours inclu	uded: 0.0						
Learning activity and number of study hours	Learning activity	Participation in classes includ plan	n didactic ed in study	Participation i consultation h	rticipation in ∩sultation hours		udy	SUM
	Number of study hours	45		5.0		50.0		100
Subject objectives	To familiarize students with the basic concepts of selected dynamic operations (fluid flows, mixing, filtration, fluidyzation), the heat exchange, and the membrane separation. Presenting students the opportunities to use mathematical equations in the description of the unit operations used in material production technologies. Developing students' computing skills for the selected unit operations.							
Learning outcomes	Course out	come	Subject outcome Method of verifica			fication		
	[K6_U05] interprets phenomena occurring around the technological process and processes occurring in the life cycle of devices and systems, makes a critical assessment of the functioning of existing solutions		analyzes the course of selected unit operations, indicates their driving force, and evaluates the efficiency of heat transport in heat exchangers and the efficiency of mixture separation using membrane methods.			[SU5] Assessment of ability to present the results of task [SU4] Assessment of ability to use methods and tools [SU2] Assessment of ability to analyse information		
	[K6_W05] demonstrates practical knowledge related to technological processes, utilized devices and systems, has knowledge regarding selected processes monitoring tools		identifies selected unit operations used in material production technologies, can classify them, and selects appropriate mathematical tools for designing technologies.			[SW3] Assessment of knowledge contained in written work and projects [SW1] Assessment of factual knowledge		
Subject contents	Fundamentals of fluid statics. Flow of ideal fluids, Bernoulli's equation. Flow of real fluids: laminar and turbulent flow. Flow of non-Newtonian fluids. Pressure drop during fluid flow through pipes. Pump power required to transport fluid. Optimum pipeline diameter. Fluidization. Filtration at constant pressure. Heat exchange: heat conduction, heat transfer during free and forced convection, radiation. Heat exchangers: heat balance, equivalent temperature difference, heat exchange surface. Reduction of heat losses. Membrane processes: principle of transport of components through membranes, membrane - membrane module - membrane installation, principle of balancing membrane modules and installations. Types of membrane processes: microfiltration, ultrafiltration, nanofiltration, reverse osmosis, gas separation, pervaporation, dialysis and electrodialysis.							
Prerequisites and co-requisites	Knowledge of the properties of liquids and gases.							

Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade			
	Laboratory	60.0%	30.0%			
	Mini-projects and project	60.0%	30.0%			
	Lecture tests	60.0%	40.0%			
Recommended reading	Basic literature	 D. W. Green (ed.): Perry's Chemical Engineers'Handbook, The McGrow-Hill Comp. Inc. (8th ed.) 2008 McCabe W.L., Smith J.C., Harriot P., Unit operations of chemical operations. 7th Edition. McGraw Hill Education 2005. 				
		3. J. D. Seader, E. J. Henley, D. K. Roper: Separation Process Principles, 3rd ed., John Wiley & Sons, Inc. 2010.				
	Supplementary literature	1. T. Hobler: Ruch ciepła i wymienniki, WNT 1979				
		2. F. Stręk: Mieszanie i mieszalniki, WNT 1981				
		3. J. Kamieński: Mieszanie układów wielofazowych, WNT 2004				
	eResources addresses					
Example issues/ example questions/ tasks being completed	 Explain the differences between laminar and turbulent fluid flow. What parameters affect pressure loss during fluid flow in pipes? List the parameters characterizing the granular bed. Describe one of the methods for determining the porosity of the bed. Explain how you can increase the heat transfer coefficient in forced convection. Draw any installation consisting of two membrane modules. Describe the streams. Write the mass balance of the component retained in a single module and the entire plant. 					
Work placement	Not applicable					

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