GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	, PG_00037592		
Field of study	Green Technologies		
Date of commencement of studies	October 2020	Academic year of realisation of subject	2021/2022
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	7.0
Learning profile	general academic profile	Assessment form	exam
Conducting unit	Department of Process Engineering and Chemical Technology -> Faculty of Chemistry		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Donata Konopacka-Łyskawa	
	Teachers	dr hab. inż. Donata Konopacka-Łyskawa dr inż. Piotr Rybarczyk dr inż. Karolina Kucharska	

Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	30.0	45.0	0.0	105
	E-learning hours included: 0.0						
	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	105	5.0	65.0	175

Subject objectives	To familiarize students with the basic concepts of selected dynamic operations (fluid flows, filtration, settling of particles), the heat exchange and the mass exchange. Presenting students the opportunities to use mathematical equations in the description of the unit operations used in proces engineering. Developing students' computing skills for the relevant unit operations.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_U05] can formulate and solve engineering tasks analytical methods, simulation as well as experimental, able to apply knowledge of basic physics and mathematics to analyze the results of experiments, is able to analyze and assess existing technical solutions	Student is able to: indicate the sources of fluid pressure losses in the installation, describe ways of heat transfer and mass transfer, indicate the driving force of processes. Student is able to select a pump, a filter, a heat exchanger and a mass exchanger. The student is able to perform basic calculations of selected unit processes.	[SU4] Assessment of ability to use methods and tools [SU3] Assessment of ability to use knowledge gained from the subject [SU1] Assessment of task fulfilment
[K6_K01] understands the need for learning throughout life, can inspire and organize the learning process of others. Is aware of his/her own limitations and knows when to ask the experts, can properly identify priorities for implementation, critically evaluate his knowledge	The student can organize his learning process to develope mini-projects, projects and laboratory exercises.	[SK1] Assessment of group work skills [SK5] Assessment of ability to solve problems that arise in practice [SK3] Assessment of ability to organize work
[K6_W06] has a basic knowledge of chemical engineering, mechanical engineering and chemical equipment, knows and understands basic processes taking place in green, proenvironmental technologies	Student understands and explains fundamental definitions of dynamic operations, heat exchanges of mass transfer processes in the environmental protection and engineering. Student knows and recognizes basic apparatus used in selected unit operations.	[SW2] Assessment of knowledge contained in presentation [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 resistance in the tubes and through a packed bed. Type of pumps. Free settling. Hydraulic classificator. Dust settling chamber. Filtration under a constant pressure. Types of filters. Heat transfer: heat conduction, free and forced convection, radiation. Heat exchangers. Countercurrent absorption, countercurrent absorption with recirculation of the solvent; number of theoretical plates; the efficiency of the plate; height of the packed bed. Extraction: single contact extraction, co-current multistage extraction, multi-stage countercurrent extraction. Drying of porous solids: parameters of humid air, equilibrium and kinetics of drying.

Prerequisites and co-requisites

Knowlege of the properties of liquids and gases. Basic knowlege of physical chemistry.

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
project tests	60.0%	25.0%
written exam	60.0%	40.0%
laboratorium	100.0%	30.0%
mini-projects and project	100.0%	5.0%

Recommended reading

Basic literature	1. D. W. Green (ed.): Perry's Chemical Engineers'Handbook, The McGrow-Hill Comp. Inc. (7th ed.) 1997 2. D. M. Himmelblau: Basic Principles and Calculation in Chemical Engineering , Prentice Hall PTR (6th ed.) 1996 3. S. Katoh, J.Horiuchi, F. Yoshida: Biochemical engineering, Wiley 2015
Supplementary literature	1. I Hołowacz (red): Przykłady i zadania z podstaw inżynierii chemicznej i procesowej, WPG 2017 2. D. Konopacka-Łyskawa (red.): Podstawy inżynierii chemicznej i procesowej. Wybrane zagadnienia wraz z zadaniami do ćwiczeń rachunkowych, projektowych i laboratoryjnych, WPG 2012 3. Praca zbiorowa: Zadania projektowe z inżynierii procesowej, OWPW 2002
eResources addresses	

Example issues/ example questions/ tasks being completed

Work placement

Not applicable