GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Separation processes in refinery and petrochemical technologies, PG_00069028		
Field of study	Chemical Technology		
Date of commencement of studies	October 2026	Academic year of realisation of subject	2029/2030
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	4	Language of instruction	Polish
Semester of study	7	ECTS credits	3.0
Learning profile	general academic profile	Assessment form	exam
Conducting unit	Department of Process Engineering and Chemical Technology -> Faculty of Chemistry -> Faculties of Gdańsk University of Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Donata Konopacka-Łyskawa	
	Teachers		

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	15.0	0.0	15.0	0.0	15.0	45

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	45	5.0	25.0	75

Subject objectives

The aim of this course is to familiarize students with and consolidate their knowledge of the processes and techniques used to separate the components of single- and two-phase mixtures found in refinery technologies. The course aims to present various approaches to selecting the appropriate separation method for a given mixture and to develop practical skills in carrying out separation processes using selected methods.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_U03] Uses chemical knowledge to design compounds, perform physicochemical and analytical measurements, and obtain appropriate sources of information.	uses chemical knowledge, especially in the field of physical chemistry, to analysis the processes of mixture separation occurring in refinery technologies.	[SU2] Assessment of ability to analyse information [SU4] Assessment of ability to use methods and tools
[K6_U08] Is able to select elements of automatic control systems for simple technological processes and use computer programs to control and optimize chemical processes.	is able to select the appropriate process for separating liquid or gaseous mixtures produced in refinery technologies, taking into account the physicochemical properties of the components and technological efficiency criteria.	[SU3] Assessment of ability to use knowledge gained from the subject [SU2] Assessment of ability to analyse information
[K6_W07] Has knowledge of raw materials and technologies in the chemicaland polymer industries, also covering issues of corrosion and material protection.	has knowledge of separation processes used in refinery technologies for separating mixtures, including multi-component ones.	[SW3] Assessment of knowledge contained in written work and projects [SW1] Assessment of factual knowledge

Subject contents

Course content – lecture

In this lecture, students will learn the theoretical foundations of separation processes used in refinery technologies:

- Emulsion separation. Electrodehydrators.
- Physicochemical equilibria for multicomponent systems.
- Multicomponent distillation. Sidedrafts in a column.
- Extractive distillation and solvents used in this process.
- Cryogenic distillation.
- Physical and chemical absorption. Desorption.
- Multicomponent absorption.
- Adsorption. Pressure swing adsorption.
- Solvent extraction.
- Membrane processes.

Course content – laboratory

In the laboratory, students complete five exercises:

- Separation of a gas mixture using high-pressure absorption.
- Determination of bed breakthrough time during adsorption.
- Separation of a gas mixture using adsorption.
- Desalination of water using reverse osmosis.
- Separation of a multicomponent mixture using distillation.

Course content – seminar

During the seminar classes, students analyze the separation processes of typical mixtures found in refinery plants, e.g. the operation of PSA installations for hydrogen separation, the operation of ROSE installations, electrodehydrators, air components separation by cryogenic distillation, extractive distillation used to separate BTX fractions from non-aromatic compounds, and amine washing.

Prerequisites and co-requisites

knowledge of issues in the field of physical chemistry and chemical engineering

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Laboratory (performing laboratory exercises, tests and reports)	100.0%	30.0%
Presentation	100.0%	15.0%
Problems (seminar)	60.0%	15.0%
Writning test	60.0%	40.0%

Recommended reading

Basic literature	J.-P. Wauquier, Petroleum Refining. Volume 2 : Separation Processes, Edition Technip, 2000 A. B. de Haan, H. Bosch, Industrial Separation Processes : Fundamentals, De Gruyter, 2013 F. M. Khoury, Multistage separation processes, Taylor & Francis, 2015
Supplementary literature	J. S. Seader, E. J. Henley, D. K. Roper, Separation process principles, Wiley, 2019
eResources addresses	

Example issues/ example questions/ tasks being completed

Explain how to determine the boiling point of a multicomponent mixture for a given pressure.

What parameters influence the amount of heat supplied to the boiler in a rectification column?

Explain the operation of a PSA system.

Explain the operating principle of a ROSE system.

Propose two methods for separating randomly selected mixtures. During the method presentation: a) explain the basis for selecting the methods for separating the mixture; b) what data is needed to select a specific method; c) indicate the evaluation criteria for a given separation method.

Practical activites within the subject

Not applicable

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