



Subject card

Subject name and code	Separation Techniques, PG_00048918						
Field of study	Chemistry in Construction Engineering						
Date of commencement of studies	October 2020	Academic year of realisation of subject			2022/2023		
Education level	first-cycle studies	Subject group					
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			4.0		
Learning profile	general academic profile	Assessment form			assessment		
Conducting unit	Department of Analytical Chemistry -> Faculty of Chemistry						
Name and surname of lecturer (lecturers)	Subject supervisor	prof. dr hab. inż. Bożena Zabiegała					
	Teachers	prof. dr hab. inż. Bożena Zabiegała					
		dr hab. inż. Marek Tobiszewski					
		dr hab. inż. Mariusz Marć					
		prof. dr hab. inż. Agata Kot-Wasik					
	prof. dr hab. inż. Andrzej Wasik						
	dr inż. Małgorzata Rutkowska						
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	30.0	0.0	15.0	60
	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	60		5.0		35.0	100
Subject objectives	Familiarising students with the basic techniques used to separate mixtures						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	K6_W03	The student knows and understands the mechanisms used to separate mixtures of chemical compounds. The student learns the principles of the selection of analytical conditions of the separation process based on the physicochemical properties of the compounds. He learns to design simple separation processes himself and choose the right technique to solve a specific separation problem.	[SW1] Assessment of factual knowledge
	K6_U06	He can design the process of separating mixtures himself. Choose the right separation technique to solve the separation problem. He can work independently and as a team, he can estimate the time it takes to complete a task	[SU1] Assessment of task fulfilment [SU5] Assessment of ability to present the results of task
	K6_W08	The student acquires knowledge in the separation of complex, homogeneous mixtures of chemical compounds on an analytical, preparation scale. The student acquires the theoretical knowledge necessary to understand the processes and phenomena used to isolate and separate the components of complex mixtures.	[SW1] Assessment of factual knowledge [SW2] Assessment of knowledge contained in presentation
Subject contents	<p>The rules for choosing the separation technique depending on the separation problem. Adsorption of ingredients from homogeneous mixtures. Characteristics of adsorbents. Gas extraction and solvent extraction, theory and practice. The basics of extraction with liquid in a supercritical state. Modern chromatographic techniques as tools for separating complex mixtures, analytical, preparation, industrial applications. Chromatography of exclusion, determination of the distribution of molar mass.</p> <p>The student acquires the theoretical knowledge necessary to understand the processes and phenomena used to isolate and separate the components of complex mixtures. He learns the principles of the selection of analytical conditions for the separation process based on the physico-chemical properties of the separated substances. He learns to design simple separation processes himself and choose the right technique to solve a specific separation problem.</p> <p>The student performs all laboratory exercises himself, the number of which is determined by the attending physician. In laboratory classes, the student independently operates the test apparatus, prepares a report describing the theoretical basis of the separation technique used and presents the results obtained during the laboratory with their interpretation.</p>		
Prerequisites and co-requisites	Basic knowledge of physical, analytical and organic chemistry		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Laboratory - completing the test, performing independent exercises and preparing a report on the exercises performed.	60.0%	30.0%
	Lecture - test	60.0%	30.0%
	Seminar - preparing a presentation and delivering a speech. Active participation in seminar classes.	60.0%	40.0%
Recommended reading	Basic literature	1. Z. Witkiewicz, Podstawy Chromatografii, WN-T, Warszawa 2005, 2. A. Narębska [red] Membrany i membranowe techniki rozdzielu, wyd. UMK, Toruń 1997 3. P. Stepnowski, E. Synak, B. Szafranek, Z. Kaczyński Techniki, Separacyjne, Wyd Uniwersytetu Gdańskiego, UG, 2010.	
	Supplementary literature	1. Z. Witkiewicz, J. Heptery Chromatografia gazowa, WN-T, Warszawa 2001 2. Zygmunt Jamrógiewicz, Jacek Namieśnik Fizykochemiczne metody kontroli zanieczyszczeń środowiska - praca zbiorowa, Wydawnictwa Naukowo Techniczne	

	eResources addresses	<p>Adresy na platformie eNauczenie:</p> <p>Techniki Separacji - Seminarium - 2023 - Moodle ID: 18121 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=18121</p> <p>Techniki Separacji - Seminarium - 2023 - Moodle ID: 18121 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=18121</p> <p>Techniki Separacji - Seminarium - 2023 - Moodle ID: 18121 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=18121</p>
Example issues/ example questions/ tasks being completed	<p>Dialysis types, theoretical bases, properties, use in the separation of homogeneous liquid mixtures</p> <p>Gas extraction theory and practice, application</p> <p>Solid sorbents; classification, characteristics, physico-chemical properties, analytical and process application</p> <p>Chromatographic techniques - analytical and preparation scale</p> <p>Membrane processes used in the separation of liquid and gaseous mixtures</p>	
Work placement	Not applicable	