



Subject card

Subject name and code	Separation Techniques, PG_00048918						
Field of study	Chemistry in Construction Engineering						
Date of commencement of studies	October 2023	Academic year of realisation of subject			2024/2025		
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	Department of Analytical Chemistry -> Faculty of Chemistry						
Name and surname of lecturer (lecturers)	Subject supervisor						
	Teachers						
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_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				
	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.				
	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.				

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	<table border="1" data-bbox="451 640 1487 920"> <thead> <tr> <th data-bbox="451 640 794 674">Subject passing criteria</th> <th data-bbox="794 640 1137 674">Passing threshold</th> <th data-bbox="1137 640 1487 674">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="451 674 794 775">Laboratory - completing the test, performing independent exercises and preparing a report on the exercises performed.</td> <td data-bbox="794 674 1137 775">60.0%</td> <td data-bbox="1137 674 1487 775">30.0%</td> </tr> <tr> <td data-bbox="451 775 794 875">Seminar - preparing a presentation and delivering a speech. Active participation in seminar classes.</td> <td data-bbox="794 775 1137 875">60.0%</td> <td data-bbox="1137 775 1487 875">40.0%</td> </tr> <tr> <td data-bbox="451 875 794 920">Lecture - test</td> <td data-bbox="794 875 1137 920">60.0%</td> <td data-bbox="1137 875 1487 920">30.0%</td> </tr> </tbody> </table>			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%	Seminar - preparing a presentation and delivering a speech. Active participation in seminar classes.	60.0%	40.0%	Lecture - test	60.0%	30.0%
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%													
Seminar - preparing a presentation and delivering a speech. Active participation in seminar classes.	60.0%	40.0%													
Lecture - test	60.0%	30.0%													
Recommended reading	<table border="1" data-bbox="451 931 1487 1223"> <tbody> <tr> <td data-bbox="451 931 794 1043">Basic literature</td> <td colspan="2" data-bbox="794 931 1487 1043">           1. Z. Witkiewicz, Podstawy Chromatografii, WN-T, Warszawa 2005,            2. A. Narębska [red] Membrany i membranowe techniki rozdziału, wyd. UMK, Toruń 1997            3. P. Stepnowski, E. Synak, B. Szafranek, Z. Kaczyński Techniki, Separacyjne, Wyd Uniwersytetu Gdańskiego, UG, 2010.         </td> </tr> <tr> <td data-bbox="451 1043 794 1178">Supplementary literature</td> <td colspan="2" data-bbox="794 1043 1487 1178">           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         </td> </tr> <tr> <td data-bbox="451 1178 794 1223">eResources addresses</td> <td colspan="2" data-bbox="794 1178 1487 1223">Adresy na platformie eNauczanie:</td> </tr> </tbody> </table>			Basic literature	1. Z. Witkiewicz, Podstawy Chromatografii, WN-T, Warszawa 2005, 2. A. Narębska [red] Membrany i membranowe techniki rozdziału, 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	Adresy na platformie eNauczanie:				
Basic literature	1. Z. Witkiewicz, Podstawy Chromatografii, WN-T, Warszawa 2005, 2. A. Narębska [red] Membrany i membranowe techniki rozdziału, 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	Adresy na platformie eNauczanie:														
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														