



Subject card

Subject name and code	Chromatographic methods, PG_00066116						
Field of study	Chemistry						
Date of commencement of studies	February 2025		Academic year of realisation of subject		2024/2025		
Education level	second-cycle studies		Subject group		Specialty subject group		
Mode of study	Full-time studies		Mode of delivery		at the university		
Year of study	1		Language of instruction		Polish		
Semester of study	1		ECTS credits		2.0		
Learning profile	general academic profile		Assessment form		exam		
Conducting unit	Department of Analytical Chemistry -> Faculty of Chemistry						
Name and surname of lecturer (lecturers)	Subject supervisor		prof. dr hab. inż. Agata Kot-Wasik				
	Teachers		prof. dr hab. inż. Agata Kot-Wasik				
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	15.0	0.0	0.0	30
	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	30		5.0		15.0	50
Subject objectives	The aim of the lectures is to familiarize students with various techniques that enable separation of mixtures of substances. Separation techniques with the speciall attention to chromatographic techniques, belong to the most commonly used laboratory techniques. No modern chemical laboratory can exist without them.						
	The student will be acquainted with techniques such as: modern liquid chromatography, capillary gas chromatography, liquid chromatography, supercritical fluid chromatography, capillary electrophoresis , two-dimensional techniques , identification process.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K7_U05] analyzes the functioning of devices, equipment and technological lines used in laboratories and the chemical industry	The student has knowledge of analyzing the functioning of the equipment used in the laboratory, including liquid and gas chromatographs; describes the structure and principles of operation of scientific equipment, - defines and presents the structure of typical devices.	[SU4] Assessment of ability to use methods and tools [SU1] Assessment of task fulfilment
	[K7_W02] identifies analytical techniques appropriate for solving specific analytical tasks – also in the production plant	has ordered, expanded knowledge related to modern analytical chemistry related to the use of chromatographic methods	[SW3] Assessment of knowledge contained in written work and projects [SW2] Assessment of knowledge contained in presentation [SW1] Assessment of factual knowledge
	[K7_U02] prepares detailed documentation of the results of independently conducted experiments and analyzes the obtained results, uses professional vocabulary with understanding and prepares and communicates information	has the ability to express, in an accessible way, the acquired knowledge and presenting the results of scientific discoveries concerning chemistry and using information techniques to deepen their knowledge and willing to obtain information on the latest discoveries	[SU2] Assessment of ability to analyse information [SU1] Assessment of task fulfilment
	[K7_K01] is aware of the problems related to the profession of a chemist, is able to assess the effects of the activity performed	is aware of the connections between chemical and related sciences as well as the necessity to broaden their knowledge	[SK2] Assessment of progress of work [SK1] Assessment of group work skills
Subject contents	Chromatography. Efficiency, selectivity, resolution, analysis time - the key goals of optimization. Achievements (milestones) of Tswiet today. Efficiency, selectivity, resolution, analysis time - the key goals of optimization. Modern gas chromatography. Methods of introducing analyte into the column, detection, applications. Gas and liquid chromatography as complementary techniques, similarities and differences in the optimization of separation conditions. Contemporary performance liquid chromatography. Mechanisms of retention, interaction, mobile phases, flow, detection, applications. Ultra-fast liquid and gas chromatography. Fast and ultra-fast chromatographic analysis. Chromatography of the mobile phase in supercritical state. Advantages and disadvantages of SFC. Chiral chromatography. Separation of enantiomers GC, HPLC, SFC. Combined techniques. Multidimensional chromatography. Theoretical basis and Appliance, cons, advantages and applications of techniques GCxGC and LCxLC. Electromigration techniques : CE, MECK, ITP.		
Prerequisites and co-requisites	basic knowledge of analytical chemistry		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	attendance, class participation, final essay tests of each part	60.0%	100.0%
Recommended reading	Basic literature	W. Szczepaniak, Metody instrumentalne w analizie chemicznej, PWN, W-wa, 1996. Z. Witkiewicz , Scienfiric materials/publications available at GUT	
	Supplementary literature	scientific data (publiactions) available in Elsevier, ScienceDirect, Web of Science	
	eResources addresses	Podstawowe https://www.agilent.com/cs/library/usermanuals/public/G1176-90000_034327.pdf - Book concerning GC chromatography https://www.agilent.com/cs/library/primers/public/LC-Handbook-Complete-2.pdf - Book concerning LC chromatography Adresy na platformie eNauczanie:	
Example issues/ example questions/ tasks being completed	Give four main parameters of capillary GC columns and briefly discuss their impact on the resolution. Define retention factor and explain what is the measure. Give ways how it can be improved. Explain why the capillary columns with a thin film of stationary phase most favorable choice is hydrogen. Define range of applications (general) GC. In addition, replace the four different specific applications (what and in which the sample) of that art. The construction of the chromatographic column used in HPLC. Equipment requirements to UPLC. Differences between the LC and SFC.		
Work placement	Not applicable		