University of Gdańsk

Subject card

Subject name and code	Quality control of the technological process, PG_00179336						
Field of study	Chemical Business						
Date of commencement of studies	October 2024		Academic year of realisation of subject	2026/2027			
Education level	Bachelor's studies		Subject group	Optional 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	2.0			
Learning profile	academic		Assessment form	credit			
Conducting unit	Department of Environmental Analysis -> Faculty of Chemistry -> Rector						
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. Monika Paszkiewicz					
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	0.0	0.0	30.0	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		10.0	20.0	60	
Subject objectives	The aim of the course is to introduce students to the practical and theoretical aspects of quality control in technological processes, with particular emphasis on chromatographic techniques as analytical tools for monitoring the quality of raw materials, semi-finished products and finished products. During the course, students will acquire knowledge and skills in the following areas: • theoretical foundations of chromatographic techniques, apparatus design and key operating parameters of chromatographic systems, • principles of selecting analytical conditions based on the physicochemical properties of the analysed compounds, • performing basic calculations necessary for the interpretation of analysis results, • designing and implementing processes for the separation of mixtures using the main separation techniques • quality control principles in the technological process and legal standards and requirements (e.g. GMP, GLP, ISO) • safe and correct conduct in a chromatographic laboratory, in accordance with the principles of good laboratory practice.						

Learning outcomes

Course outcome	Subject outcome	Method of verification
[BCHINŻ_U01] On the basis of the acquired knowledge, identifies, analyses and solves engineering tasks and problems in broadly understood chemistry.	- is able to perform and interpret simple quantitative and qualitative analyses, - is able to interpret the results of chromatographic analysis in the context of technological process quality control and identify any irregularities or non-compliance with norms	[SU2] presentation/project/paper/ report
[BCHINŻ_W07] Describes the construction and operating principles of basic scientific, technological and control-measuring apparatus.	- defines the basic parameters in chromatographic analysis, - knows the structure and principle of operation of basic testing equipment used for chromatographic separations, - knows the basic methods of quantitative and qualitative analysis	[SW4] test/exam - oral or written [SW2] presentation/project/paper/ report
[BCHINŻ_K02] Works individually demonstrating initiative and independence in actions, and effectively cooperates in a team, performing various roles in it.	-shows responsibility for the results of the team's work, - understands the need to follow established analytical procedures, - is responsible for their own safety and that of others: knows how to act in emergency situations, exercises caution when handling chemicals, exercises caution when handling measuring equipment	[SK8] observation of student's independent or team work
[BCHINŻ_U02] Uses basic methods, techniques and tools in formulating and solving engineering tasks in the field of chemistry.	- is able to apply chromatographic techniques (e.g. HPLC, GC) to identify and determine the components in samples of raw materials, semi-finished products and finished products - is able to apply basic methods of quantitative and qualitative analysis to identify and determine chemical compounds - is able to apply appropriate calculations and validation criteria to assess the quality of analysis results and the correct operation of analytical	[SU2] presentation/project/paper/ report [SU8] observation of student's independent or team work
[BCHINŻ_U03] Plans, selects the appropriate research and measuring equipment and performs simple chemical experiments; analyses the results and draws conclusions based on them.	- is able to select the appropriate chromatographic technique and separation parameters for the analysis of selected compounds based on their physicochemical properties, - is able to optimise the basic operating parameters of the measuring equipment based on experimental data	[SU2] presentation/project/paper/ report [SU4] test/exam - oral or written

Subject contents

Classification of separation methods, including the division of techniques for separating components of mixtures used in the quality control of raw materials, semi-finished products and finished products. Theoretical basis of the chromatographic process, including separation mechanisms such as adsorption, partitioning, ion exchange and exclusion, and factors affecting the efficiency and selectivity of analysis. Preparation of samples for chromatographic analysis, methods of extraction of solid and gaseous samples, including liquid-liquid extraction, solid-phase extraction (SPE), microextraction (SPME). Gas chromatography (GC): sample dosing systems, column types and detectors (FID, TCD, ECD, MS), selection of analysis parameters. High-performance liquid chromatography (HPLC): pumps, dispensers and detectors (UV, DAD, MS), as well as selection of columns and stationary phases (normal phase, reversed phase, ion exchange phases) and mobile phases.

Prerequisites and co-requisites

General chemistry, organic chemistry, inorganic chemistry, analytical chemistry.

Knowledge of basic general chemistry, organic chemistry, inorganic chemistry and analytical chemistry.

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Assessment of partial tests carried out during laboratory exercises	51.0%	50.0%
Report	51.0%	50.0%

Recommended reading

Basic literature	Witkiewicz Z. Fundamentals of chromatography, WNT, Warsaw, 2005. Szczepaniak W. Instrumental methods in chemical analysis, PWN, Warsaw, 1996. Stepnowski P., Synak E., Szafranek B., Kaczyński Z. Separation techniques. UG Publishers 2010

	Supplementary literature	Kocjan R. Analytical chemistry. Handbook for students. Volume 2. PZWL, Warsaw, 2000. Witkiewicz Z., Hepter J. Gas chromatography, WNT, Warsaw, 2009.
	eResources addresses	
Example issues/ example questions/ tasks being completed		
Work placement	Not applicable	

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