GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Novel Analytical Techniques , PG_00043563		
Field of study	Green Technologies		
Date of commencement of studies	February 2024	Academic year of realisation of subject	2024/2025
Education level	second-cycle studies	Subject group	Obligatory subject group in the field of study 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	1	Language of instruction	Polish
Semester of study	2	ECTS credits	5.0
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	dr hab. inż. Justyna Płotka-Wasylka	
	Teachers		

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	15.0	0.0	45.0	0.0	15.0	75

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	75	10.0	40.0	125

Subject objectives

Getting acquainted with modern analytical techniques in theory and practice that will enable the monitoring and analysis of environmental pollution, food and other samples with a complex matrix composition

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_W02] a broader and deeper knowledge of the soil, air and water from pollution useful to formulate and solve complex tasks in the field of environmental technologies and modern analytical methods	The student is able to analyze phenomena and provide methods for them analysis and monitoring, so much needed in terms of construction	[SW1] Assessment of factual knowledge
[K7_K01] is ready to solve the most common problems associated with the profession of engineer, correctly identifies and resolves dilemmas associated with the profession of engineer, assesses risks and is able to assess the effects of the activity	The student is able to solve the problem analytical related to pollution or emissions contamination of materials construction sites and places construction	[SK5] Assessment of ability to solve problems that arise in practice [SK1] Assessment of group work skills
[K7_W01] a broader and deeper knowledge of certain branches of mathematics, including elements of applied mathematics and optimization methods including mathematical methods, useful to formulate and solve complex tasks in the field of environmental technologies and modern analytical methods	After completing the course, the student will have knowledge of issues related to analytical techniques, which can be used for analysis and pollution monitoring building materials and construction sites.	[SW1] Assessment of factual knowledge

Subject contents	Basic information on modern analytical techniques. Statistical analysis of the results. Modern gas chromatography. Modern liquid chromatography. Ultrafast Chromatography. Atomic and emission spectroscopy Electromigration techniques and SFC chromatography Mass spectrometry. Different types of mass spectrometers (MS, MS / MS, TOF, Orbitrap, IM) Preparation of samples for analysis Combined techniques. Topics are discussed in the context of the analysis and monitoring of various elements of the environment with respect to the principles of sustainable development.
Prerequisites and co-requisites	Basic knowledge of chemistry and green chemistry.

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Lecture	60.0%	45.0%
Seminars	60.0%	10.0%
Laboratory	60.0%	45.0%

Recommended reading

Basic literature	1. Marian Kamiński, Podstawowe pojęcia i parametry opisujące układychromatograficzne. Podstawowe zasady efektywnego stosowaniachromatografii cieczowej do rozdzielania i oznaczania składumieszanin, PG, 20102. Praca zbiorowa pod redakcj M. Kamiskiego Chromatografiacieczowa, CEEM, Gdask, 2004.3. D. Berek, M. Dressler, M. Kubin, K. Marcinka Chromatografiaelowa PWNWarszawa 1989.4. European Committee for Standardization, Safety of toys. Organicchemical compounds. Methods of analysis, BS EN 71-11:20055. M. Marć, B. Zabiegała, J. Namieśnik, Trends Anal. Chem., 32 (2012)766. A. Kot-Wasik, B. Zabiegała, M. Urbanowicz, E. Dominiak, A. Wasik,J. Namieśnik, Anal. Chim. Acta 602 (2007) 1417. M. Urbanowicz, B. Zabiegała, J. Namieśnik, Anal. Bioanal. Chem.,399 (2011) 2778. A. Cygański, Podstawy metod elektroanalitycznych, WNT,Warszawa, 1999.9. S L R Ellison, A Williams, Quantifying Uncertainty in AnalyticalMeasurement, EURACHEM/CITA, 2011.
Supplementary literature	J. Warych, Oczyszczanie przemysłowycy gazów odlotowych, WNT,Warszawa, 1988.W. Lewandowski, Techniczno-technologiczne i aparaturowe aspektyochrony powietrza, Wydawnictwo Poli-techniki Gdańskiej, Gdańsk, 2011 Modern analytical techniques in the pharmaceutical- and bioanalysis, Dr. Istvan Bak, University of Debrecen, Medical and Health Science Center, Kiadó Budapest, 2011
eResources addresses	Adresy na platformie eNauczanie:

Example issues/ example questions/ tasks being completed	1. Draw a diagram of a) GC-MS system and b) LC-MS. 2. Indicate the advantages of atomic absorption spectrometry. 3. How to use light absorption (UV-VIS) to identify compounds 4. List the validation parameters and define two of them. 5. How to conduct a quantitative analysis - indicate the main steps. 6. The retention time in GC chromatography depends on: (indicate) 7. Propose an analytical technique that can be used; a) determination of vitamins in drinking water _____ b) Determination of sweeteners in sewage samples _____ c) the content of ethanol in the blood _____ d) BTEX emitted from paints _____ e) residual solvent in drugs _____ f) Determination of protein mass _____ g) mercury content in sediments _____ i) the content of cations and ions in the mineral water _____ 8. List the laboratory experimental items you experienced during Novel Anal. Techniques. Highlight the best (in your opinion). 9. Explain the differences in MS and MS / MS mode. 10. What are supercritical fluids? What are their properties (physical and chemical)? 11. Draw a chromatogram showing the separation of 4 compounds. Draw an example of a UV spectrum. Draw an example of the MS spectrum. Describe the axis.
Work placement	Not applicable