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	October 2023	Academic year of realisation of subject	2023/2024
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	1	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_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	the student has the skill solving the most common problems related to using techniques analytical	[SW1] Assessment of factual knowledge [SW3] Assessment of knowledge contained in written work and projects
[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 has the ability to choose analytical methods enabling analysis in soil and air protection and water against pollution	[SW1] Assessment of factual knowledge [SW3] Assessment of knowledge contained in written work and projects
[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 has skills solving tasks in the field environmental protection and modern methods analytical	[SK5] Assessment of ability to solve problems that arise in practice [SK1] Assessment of group work skills

Subject contents	Introduction to Novel Analytical Techniques Statistical Data Evaluation Modern GC Modern HPLC Modern UPLC *Atomic absorption spectroscopy* *Electromigration techniques & Supercritical Fluid Chromatography* *Atomic emission spectroscopy* Mass spectrometry Mass spectrometry (MS, MS/MS, TOF, Orbitrap, IM) Recent trends in sample preparation Hyphenated 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 analytical chemistry and analytical techniques, as well as the principles of green chemistry.

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
laboratory experiments	60.0%	45.0%
exam	60.0%	45.0%
seminars	60.0%	10.0%

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	Modern analytical techniques in the pharmaceutical- and bioanalysis, Dr. Istvan Bak, University of Debrecen, Medical and Health Science Center, Kiadó Budapest, 2011 J. Warych, Oczyszczanie przemysłowycy gazów odlotowych, WNT,Warszawa, 1988.W. Lewandowski, Techniczno-technologiczne i aparaturowe aspektyochrony powietrza, Wydawnictwo Poli-techniki Gdańskiej, Gdańsk, 2011
eResources addresses	Adresy na platformie eNauczanie:

Example issues/ example questions/ tasks being completed	1. Draw schematic diagram of a) GC-MS and b) LC-MS system. 2. Point out advantages of Atomic Absorption Spectrometry. 3. How to apply absorption of the light (UV-VIS) for the identification of compounds 4. List the validation parameters and define the two of them. 5. How to perform quantitative analysis point out main steps. 6. Retention time in GC chromatography depends on: *(point out)* 7. Propose analytical technique that can be applied for; a) vitamins determination in drinking water _____ b) sweeteners determination in waste water samples _____ c) ethanol content in blood _____ d) BTEX emitted from paints _____ e) solvent residue in medicaments _____ f) protein mass determination _____ g) mercury content in sediment _____ i) content of cations and ions in mineral water _____ 8. List lab experomental subjects that You have experienced during Novel Anal. Techniques. Underline the best *(in You 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 chromatogram showing separation of 4 compounds. Draw example of UV spectrum. Draw example of MS spectrum. Describe axis.
Work placement	Not applicable