GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	NOVEL ANALYTICAL TECHNIQUES, PG_00048969		
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	English
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

The aim of the course is to complement and broaden the student's knowledge on the use of modern analytical tools.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[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	
[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	
[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	

<table>
<tr><td>Subject contents</td><td>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</td></tr>
<tr><td>Prerequisites and co-requisites</td><td>Basic knowledge of analytical chemistry and analytical techniques</td></tr>
<tr><td>Assessment methods and criteria</td><td><table><tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr><tr><td>exam</td><td>60.0%</td><td>50.0%</td></tr><tr><td>seminars</td><td>60.0%</td><td>25.0%</td></tr><tr><td>laboratory experiments</td><td>60.0%</td><td>25.0%</td></tr></table></td></tr>
<tr><td>Recommended reading</td><td><table><tr><td>Basic literature</td><td>Modern Analytical Chemistry, David Harvey, DePauw University, free available www.chemmsu.ru/download/2kurs/analitika/ ModernAnalyticChemistry.pdf</td></tr><tr><td>Supplementary literature</td><td>Modern analytical techniques in the pharmaceutical- and bioanalysis, Dr. Istvan Bak, University of Debrecen, Medical and Health Science Center, Kiadó • Budapest, 2011</td></tr><tr><td>eResources addresses</td><td>Adresy na platformie eNauczanie:</td></tr></table></td></tr>
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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