University of Gdańsk

Subject card

Subject name and code	Graduate study lecture - Contemporary methods in mass spectrometry, PG_00040397		
Field of study	Chemistry		
Date of commencement of studies	October 2024	Academic year of realisation of subject	2024/2025
Education level	Master's studies	Subject group	Obligatory subject group in the field of study Optional 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	2	ECTS credits	3.0
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	dr hab. Monika Paszkiewicz	

Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	0.0	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	40.0	75

Subject objectives	To introduce students to the construction and principle of operation of modern mass spectrometers, taking into account the range of applications and limitations, to familiarise them with the basic principles of interpretation of mass spectra of selected classes of organic compounds using various ionisation techniques.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[CHEMMU2_K01] Knows the limitations of her/his own knowledge; understands the need for further education and can inspire other people to do so.	- Is able to appropriately identify priorities for the achievement of tasks by him/herself or others - Maintains openness to new developments related to the analysis of compounds by mass spectrometry - Explains to others the importance of the development of modern analytical methods - Appreciates the role of international contacts in the development of scientific research - Understands the need for lifelong learning	[SK1] oral statement/conversation/ discussion [SK8] observation of student's independent or team work
[CHEMMU2_U02] Critically assesses the results of conducted, performed observations and theoretical calculations and discusses errors.	- Has the ability to critically evaluate the results of experiments carried out, observations made and/or theoretical calculations made	[SU1] oral statement/conversation/ discussion
[CHEMMU2_W05] Has extended knowledge in the field of the specialisation studied.	- Knows the structure and principle of operation of a mass spectrometer - Recognises and characterises the types of ions involved in mass spectrometry - Knows the possibilities of combining mass spectrometry with chromatographic techniques - Knows examples of the use of mass spectrometry in scientific research - Knows the theory of the fragmentation process	[SW4] test/exam - oral or written [SW5] implementation of a problem task

Subject contents

Historical development and significance of mass spectrometry. Structure and principle of operation of the mass spectrometer. Combined techniques: gas chromatography combined with mass spectrometry (GC-MS), liquid chromatography combined with mass spectrometry (LC-MS). Practical application of mass spectrometry techniques. Discussion of ionisation methods and types of analysers used in mass spectrometry. Types of ions: molecular, isotopic, pseudomolecular and metastable. Theory of the fragmentation process, fragmentation of major classes of compounds. Examples of applications of mass spectrometry for the identification of organic compounds.

Prerequisites and co-requisites

Fundamentals of chemistry, general and inorganic chemistry, organic chemistry, analytical chemistry.

Knowledge of the fundamentals of general chemistry, organic chemistry and instrumental analysis methods.

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Determination of the structure of organic compounds on the basis of mass spectra	0.0%	10.0%
Written exam with open questions and test questions	51.0%	90.0%

Recommended reading

Basic literature	R. A. W. Johnstone, M. E. Rose, Mass spectrometry, PWN, Warsaw 2001. R. M. Silverstein, F. X. Webster, D. J. Kiemle, Spectroscopic methods for the identification of organic compounds, PWN, Warsaw 2007 W. Zieliński, A. Rajca (eds.), Spectroscopic methods and their application to identification of organic compounds, WNT, Warsaw 1995
Supplementary literature	eds. by P. Suder and J. Silberring, Mass Spectrometry, WUJ, Krakow 2006
eResources addresses	

Example issues/ example questions/ tasks being completed

Work placement

Not applicable

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