

Subject card

Subject name and code	Practical Mass Spectroscopy, PG_00188326						
Field of study	Praktyczna spektrometria mas (Wykład)						
Date of commencement of studies	October 2026		Academic year of realisation of subject		2028/2029		
Education level	Bachelor's 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	3		Language of instruction		Polish		
Semester of study	5		ECTS credits		1.0		
Learning profile	academic		Assessment form		exam		
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	15.0	0.0	0.0	0.0	0.0	15
	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	15		2.0		8.0	25
Subject objectives	The aim of the course is to familiarise students with: the structure and principles of operation of modern mass spectrometers, with particular emphasis on the possibilities and limitations of their use in forensic analysis; combined techniques, including liquid and gas chromatography coupled with mass spectrometry, used to identify selected compounds; the basic principles of interpreting mass spectra of selected classes of organic compounds using various ionisation techniques, the practical application of mass spectrometry and combined techniques in forensic analysis, including the preparation of reports and interpretation of data.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[AKRL3_W02] The graduate knows and understands, at an advanced level, the analytical methods used in forensic laboratories, in particular spectroscopic, chromatographic and electroanalytical methods.	1. The student knows the structure of modern mass spectrometers. 2. The student knows and understands the principles of operation of modern mass spectrometers, ionisation techniques, and methods of data collection and interpretation used in forensic laboratories. 3. The student knows the basic principles of interpreting mass spectra of selected classes of organic compounds.	[SW4] test/egzamin - ustny lub pisemny
	[AKRL3_U04] The graduate is able to select appropriate equipment for experiments and prepare reports and expert opinions based on analytical results in compliance with legal and ethical standards.	1. The student is able to select the appropriate type of mass spectrometer and the right analytical conditions for a specific research task. 2. The student is able to prepare a report in accordance with applicable legal and ethical standards.	[SU4] test/egzamin - ustny lub pisemny
	[AKRL3_K01] The graduate is ready to critically evaluate their own knowledge, understand its importance for solving cognitive and practical problems, and to seek expert opinions when necessary.	1. The student is prepared to critically evaluate results obtained using mass spectrometry and consciously identifies the possibilities and limitations of this technique.	[SK4] test/egzamin - ustny lub pisemny
	[AKRL3_U10] The graduate is able to interpret data from different analytical techniques to reconstruct events or identify evidence material.	1. The student is able to analyse and interpret the mass spectra of selected groups of compounds. 2. The student is able to integrate data obtained using mass spectrometry with the results of other analytical techniques (e.g. chromatographic, spectroscopic) for a comprehensive evaluation of evidence	[SU4] test/egzamin - ustny lub pisemny
Subject contents	Construction and operating principles of a mass spectrometer. Combined techniques, including gas chromatography coupled with mass spectrometry (GC-MS) and liquid chromatography coupled with mass spectrometry (LC-MS). Overview of ionisation methods and the types of analysers used in mass spectrometry. Types of ions: molecular, isotopic, pseudomolecular and metastable. Theory of the fragmentation process and fragmentation pathways of major classes of compounds. Practical applications of mass spectrometry in forensic analysis, including the identification of drugs, toxic substances, designer drugs, explosives and trace evidence. Interpretation of mass spectra of selected compounds.		
Prerequisites and co-requisites	General chemistry, organic chemistry, inorganic 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
	Exam	51.0%	100.0%
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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