University of Gdańsk

Subject card

Subject name and code	Spectroscopic Methods for Determining Chemical Structures, PG_00188513						
Field of study	Spektroskopowe metody wyznaczania struktur chemicznych (Ćw.laboratoryjne)						
Date of commencement of studies	October 2026		Academic year of realisation of subject	2027/2028			
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	2		Language of instruction	Polish			
Semester of study	3		ECTS credits	2.0			
Learning profile	academic		Assessment form	credit			
Conducting unit	Laboratory of Structural Research of Biopolymers -> Department of Organic Chemistry -> Faculty of Chemistry -> Rector						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. Emilia Sikorska				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	0.0	0.0	30.0	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	15.0	50	
Subject objectives	The course focuses on the practical application of spectroscopic methods for the identification and analysis of organic compounds. Students will learn to understand the advantages, limitations, and complementarity of various spectroscopic techniques, and will develop skills in spectral interpretation and structural elucidation.						

Learning outcomes

Course outcome	Subject outcome	Method of verification
[AKRL3_W04] The graduate knows and understands the basics of biological analysis of evidence material, including principles of DNA identification, proteins and other biological traces.	The student is familiar with the analysis of biological materials using spectroscopic methods and can explain which techniques are applied for the identification of biomolecules and forensic traces.	[SW4] test/egzamin - ustny lub pisemny [SW1] wypowiedź ustna/rozmowa/ dyskusja [SW3] opracowanie tekstowe/ praca pisemna [SW5] realizacja zadania problemowego
[AKRL3_K06] The graduate is ready to follow occupational health and safety regulations in the laboratory and care for the safety of themselves and others.	The student follows occupational health and safety regulations in the spectroscopic laboratory, can safely operate the available equipment, and respond appropriately to hazardous situations.	[SK1] wypowiedź ustna/rozmowa/ dyskusja [SK5] realizacja zadania problemowego [SK6] demonstracja umiejętności praktycznych [SK8] obserwacja samodzielnej lub zespołowej pracy studenta
[AKRL3_U09] The graduate is able to independently plan and implement their professional development and lifelong learning.	The student can design studies using spectroscopic methods, efficiently search the scientific literature, analyze practical instrument solutions, and consciously plan their further development in the field of structural analysis.	[SU1] wypowiedź ustna/rozmowa/ dyskusja [SU3] opracowanie tekstowe/ praca pisemna [SU4] test/egzamin - ustny lub pisemny [SU5] realizacja zadania problemowego [SU6] demonstracja umiejętności praktycznych [SU8] obserwacja samodzielnej lub zespołowej pracy studenta
[AKRL3_K02] The graduate is ready to make reliable, objective decisions and take responsibility for the interpretation of research results.	The student makes responsible and objective interpretative decisions in spectral analysis and is able to identify the limitations of spectroscopic data as well as the risk of misinterpretation.	[SK1] wypowiedź ustna/rozmowa/ dyskusja [SK3] opracowanie tekstowe/ praca pisemna [SK4] test/egzamin - ustny lub pisemny [SK5] realizacja zadania problemowego [SK6] demonstracja umiejętności praktycznych [SK8] obserwacja samodzielnej lub zespołowej pracy studenta
[AKRL3_U01] The graduate is able to identify, analyse and solve complex research problems in chemistry and forensic science by selecting appropriate methods and information sources.	The student is able to interpret spectroscopic data and use it to recognize and analyze complex structural problems of organic molecules, selecting appropriate spectroscopic techniques as needed.	[SU1] wypowiedź ustna/rozmowa/ dyskusja [SU3] opracowanie tekstowe/ praca pisemna [SU4] test/egzamin - ustny lub pisemny [SU5] realizacja zadania problemowego [SU6] demonstracja umiejętności praktycznych [SU8] obserwacja samodzielnej lub zespołowej pracy studenta

Subject contents

Physical fundamentals of the interaction of electromagnetic radiation with matter, including absorption, emission, and scattering. Types of spectra and their significance in identifying chemical compounds. Overview of the basic components of spectroscopic equipment, operating principles, and factors affecting measurement quality. Sample preparation and spectral measurements for selected organic compounds. Practical spectral analysis, including verification and interpretation of measurement results. Comparison of spectroscopic methods, emphasizing the advantages, limitations, and complementarity of each technique in structural analysis.

Prerequisites and co-requisites

Completed basic course in organic chemistry.

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Assessment will include entry tests, evaluation of student performance, and positive grading of laboratory exercise reports.	51.0%	100.0%

Recommended reading	Basic literature	1. Collectively edited W. Zieliński i A. Rajca: Spectroscopic methods and their application in the identification of organic compounds, WNT Warszawa 1995, 2000. 2. R.M. Silverstein, F.X. Webster, D.J. Kiemle: Spectroscopic identification of organic compounds, PWN Warszawa 2007. 3. B. Wojtkowiak, Martial Chabanel: Molecular spectroscopy, PWN Warszawa 1984. 4. Z. Kęcki: Basics of molecular spectroscopy, PWN Warszawa 1998. 5. W. Danikiewicz: Mass Spectrometry: Basics and Applications, PWN Warszawa 2020.
	Supplementary literature	1. H. Barańska, A. Łabudzińska, J. Terpiński: Laser Raman Spectrometry, Analytical Applications, PWN, Warszawa 1981. 2. A. S. Płaziak: Mass spectrometry of organic compounds, Adam Mickiewicz University Scientific Publishing House Poznań 1997. 3. R.A.W. Johnstone, M.E. Rose: Mass spectrometry, PWN Warszawa 2001 5. S. Paszyc. Basics of photochemistry, PWN Warszawa 1992. 6. I.Z. Siemion: Biostereochemistry, PWN Warszawa 1985. 7. K. Wüthrich: NMR in biological research: peptides and proteins, North-Holland, Amsterdam 1976. 8. Scientific publications. 9. Internet: independent research, verified by the instructor.
	eResources addresses	
Example issues/ example questions/ tasks being completed		
Work placement	Not applicable	

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