

Subject card

Subject name and code	Chemical spectroscopy, PG_00081982						
Field of study	Chemistry						
Date of commencement of studies	October 2025		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	3		Language of instruction		Polish		
Semester of study	5		ECTS credits		2.0		
Learning profile	academic		Assessment form		credit		
Conducting unit	Faculty of Chemistry -> Rector						
Name and surname of lecturer (lecturers)	Subject supervisor		prof. dr hab. Sylwia Rodziewicz-Motowidło				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	0.0	30.0	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		15.0	50
Subject objectives	Learning to interpret spectra of organic compounds with masses up to ~300 D; Learning to Interpreting the aforementioned spectra toward structure determination (identification, hydrogen bonds, stereochemistry, dynamics, etc.), taking into account the qualities/limitations of the described techniques separately, as well as in an integrated manner						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[CHEML3_W04] Characterises the basic methods of chemical compound analysis.	The student distinguishes between spectroscopic techniques used in the analysis of the structure of organic compounds (NMR, IR, MS). Describes the theoretical basis of these methods and is able to indicate their application in the identification of chemical compounds.	[SW1] oral statement/ conversation/discussion
	[CHEML3_W03] Explains the relationship between the structure of matter and its observed properties.	The student understands how the structure of molecules (bond arrangement, functional groups, chemical environment) affects their NMR, IR and MS spectra. He can interpret changes in spectra due to chemical structure.	[SW1] oral statement/ conversation/discussion
	[CHEML3_W07] Understands and describes physicochemical patterns, phenomena and processes using the language of mathematics.	The student explains quantitative relationships in spectroscopic spectra and uses elements of mathematics to process and interpret data (e.g., calculating chemical shifts, molecular masses, signal intensities).	[SW1] oral statement/ conversation/discussion
	[CHEML3_U03] Selects the appropriate equipment and laboratory apparatus for conducting uncomplicated chemical experiments.	The student recognizes and selects the appropriate spectroscopic techniques and apparatus components (e.g., type of detector, samples) according to the research problem under analysis.	[SU1] oral statement/conversation/ discussion
	[CHEML3_U02] Performs analyses using experimental methods and draws conclusions based on them.	The student is able to perform spectroscopic measurements, process the obtained data and, based on them, identify a chemical compound and propose a chemical structure.	[SU4] test/exam - oral or written
	[CHEML3_W01] Enumerates basic laws and theories in chemistry, physics, mathematics and biology.	The student knows and understands the theoretical basis of spectroscopy, including the mechanisms of interaction of electromagnetic radiation with matter, and the principles of spectroscopic methods.	[SW1] oral statement/ conversation/discussion
	[CHEML3_K03] Establishes priorities in the right way for the implementation of tasks specified by herself/himself and/or by others.	The student is able to plan a spectroscopic analysis, taking into account its purpose, available resources and the sequence of activities. Makes informed decisions about the choice of methods and organization of work.	[SK1] oral statement/conversation/ discussion
	[CHEML3_U07] Prepares documented elaboration on a specific problem in the field of selected chemical and physical issues.	The student independently interprets spectroscopic spectra (NMR, IR, MS), identifies chemical compounds on their basis, and formulates conclusions about the structure of the analyzed compounds, justifying them with experimental data.	[SU1] oral statement/conversation/ discussion [SU4] test/exam - oral or written
Subject contents	Methods of interpreting molecular spectra; practical use of spectroscopic methods to study the structure and dynamics of molecules with masses up to ~300 D; comparing the probability of several possible solutions and verifying the correct solution of spectra; learning how to correctly create a description of spectra; learning the advantages and disadvantages of different spectroscopic methods, complementarity of methods; elements of structure/conformation analysis of biomolecules.		
Prerequisites and co-requisites	Passed basic organic chemistry and physical chemistry courses		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	written tests	51.0%	100.0%

Recommended reading	Basic literature	R.M. Silverstein, F.X. Webster, D.J. Kiemle: Spectroscopic Methods for the Identification of Organic Compounds, PWN W-wa 2007 Internet: independent search, verified by the instructor.
	Supplementary literature	A.S. Płaziak: Mass spectrometry of organic compounds, Wydaw. Naukowe UAM Poznań 1997R.A.W. Johnstone, M.E. Rose: Mass spectrometry, PWN W-wa 2001.Z. Kęcki: Fundamentals of Molecular Spectroscopy, PWN W-wa 1998.I.Z. Siemion: Biostereochemistry, PWN Warsaw 1985.K. Wüthrich: NMR in biological research: peptides and proteins, North-Holland, Amsterdam 1976.
	eResources addresses	
Example issues/ example questions/ tasks being completed	Set of MS, IR, NMR spectra for self-desolving	
Work placement	Not applicable	

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