University of Gdańsk

Subject card

Subject name and code	Chemical spectroscopy, PG_00081982						
Field of study	Chemistry						
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	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_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_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
[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

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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