

Subject card

Subject name and code	Monographic lecture - Selected issues in chemistry of peptides, PG_00082465						
Field of study	Chemical Business						
Date of commencement of studies	February 2026		Academic year of realisation of subject		2026/2027		
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	Laboratory of Medical Chemistry -> Department of Biomedical Chemistry -> 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	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		20.0		25.0	75
Subject objectives	Familiarization with selected spectroscopic techniques and their use in the structural study of peptides and proteins, especially conformational studies.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[BCHMU2_U02] Is able to define her/his interests, develop them within the chosen direction and in connection with the subject of her/his master's thesis by implementing the process of self-education and planning her/his professional career.	The student is able to select the content that interests him/her from the lecture topics.	[SU1] oral statement/conversation/discussion
	[BCHMU2_W05] Knows and understands the main trends in the development of chemistry combined with economics as two interpenetrating scientific disciplines.	The student knows spectroscopic techniques used to determine the structure of biomolecules and follow their conformational changes. The student knows the applications of this type of research and understands their importance.	[SW4] test/exam - oral or written [SW2] presentation/project/paper/report [SW5] implementation of a problem task
	[BCHMU2_W01] Knows and understands complex physicochemical processes and is able to analyse their course in connection with other fields of science.	The student knows the theoretical basis of the phenomena on which the presented spectroscopic techniques are based, such as circular dichroism spectroscopy (CD), infrared spectroscopy (FTIR), Raman spectroscopy, absorption and fluorescence spectroscopy. The student characterizes each technique and knows its advantages and disadvantages. The student knows and describes the elements as well as the principles of operation of the equipment used in each of the presented technique. The student knows the applications of the discussed spectroscopic techniques in the study of peptides and proteins.	[SW4] test/exam - oral or written
	[BCHMU2_U01] Is able to, on the basis of her/his knowledge, propose a solution to problems in chemistry, taking into account the economic aspect by using advanced measurement techniques.	The student recognizes and assigns a spectrum to the spectroscopic technique used to record it. The student interprets spectra of peptides and proteins in the context of the structure of the studied system and conformational changes under the influence of various factors (e.g. temperature, pH, salts, ligands, etc.). The student, independently or in a group, plans a method of analyzing the structure of a peptide or protein using the known spectroscopic techniques.	[SU1] oral statement/conversation/discussion [SU2] presentation/project/paper/report [SU4] test/exam - oral or written [SU5] implementation of a problem task
	[BCHMU2_K04] Is willing to properly assess the acquired knowledge, respect and disseminate it in order to solve specific cognitive and practical issues.	The student is critical when analyzing the results and drawing conclusions, as well as when expressing opinions, remaining open to the opinions of others.	[SK1] oral statement/conversation/discussion [SK2] presentation/project/paper/report [SK8] observation of student's independent or team work
Subject contents	Theoretical bases of circular dichroism spectroscopy (CD), infrared spectroscopy (FTIR), Raman spectroscopy, absorption and fluorescence spectroscopy. Application of the mentioned techniques in the study of the structure of peptides and proteins. Methods of tracking conformational changes of peptides and proteins on selected examples.		
Prerequisites and co-requisites	knowledge of basic issues in the field of experimental and theoretical organic chemistry and biochemistry knowledge of the structure of amino acids, peptides and proteins at a basic level knowledge of chemical spectroscopy and physical chemistry		

Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Exam	51.0%	70.0%
	Presentation of the solution to a problem task	51.0%	30.0%
Recommended reading	Basic literature	"Spectroscopic methods for determining protein structure in solution", edited by H.A. Havel, VCH Publishers, Inc., New York, Weinheim, Cambridge 1996. "Vibrational spectroscopy. From theory to practice.", edited by Kamilla Małek, PWN, Warsaw 2016. "Biospectroscopy" Vo. 2-4, edited by Jacek Twardowski, Polish Scientific Publishers PWN, Warsaw 1989, 1990 J. Twardowski, P. Anzenbacher "Raman and IR spectroscopy in biology and biochemistry", Ellis Horwood and Polish Scientific Publishers PWN, New York, London, Toronto, Sydney, Tokyo Singapore, Warsaw 1994. J.R. Lakowicz "Principles of Fluorescence Spectroscopy" wydanie 3, Springer 2006.	
	Supplementary literature	E.A. Permyakov "Luminescent Spectroscopy of Proteins", CRC Press, Boca Raton, Ann Arbor, London Tokyo 1993. I.Z. Siemion "Biostereochemistry", PWN, Warsaw 1985. P. Crabbé, "Chiroptic methods in chemistry", Polish Scientific Publishers PWN, Warsaw 1974. B. Stuart "Biological applications of infrared spectroscopy", John Wiley & Sons, Chichester, New York, Weinheim, Brisbane, Singapore, Toronto 1997. D. Sheehan "Physical biochemistry: principles and applications", John Wiley & Sons, Chichester, New York, Weinheim, Brisbane, Singapore, Toronto 2000.	
	eResources addresses	Basic https://link.springer.com/book/10.1007/978-0-387-46312-4 - J.R. Lakowicz "Principles of Fluorescence Spectroscopy" wydanie 3, Springer 2006. (access date - 13.06.2024)	
Example issues/ example questions/ tasks being completed	List the components of a spectrofluorimeter. Name three measurement techniques used in infrared spectroscopy (FTIR). Based on the presented CD spectra of proteins with unknown structures, assign each of them a dominant secondary structure type. List the advantages and disadvantages of Raman spectroscopy.		
Work placement	Not applicable		

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