

Subject card

Subject name and code	Monographic lecture - Selected issues in chemistry of peptides, PG_00049929						
Field of study	Chemistry						
Date of commencement of studies	October 2024	Academic year of realisation of subject			2025/2026		
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	2	Language of instruction			Polish		
Semester of study	3	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		5.0		40.0	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
	[CHEMMU2_K01] Knows the limitations of her/his own knowledge; understands the need for further education and can inspire other people to do so.	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 [SK8] observation of student's independent or team work
	[CHEMMU2_W05] Has extended knowledge in the field of the specialisation studied.	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.	[SW4] test/exam - oral or written [SW1] oral statement/conversation/discussion [SW2] presentation/project/paper/report [SW5] implementation of a problem task
	[CHEMMU2_W11] Demonstrates general knowledge about the current trends in the development of chemistry as a science and the latest discoveries in this field.	The student knows examples of the usage of the discussed spectroscopic techniques for structural studies of biomolecules. Based on this knowledge, he/she can initially plan structural studies of new systems using the discussed techniques.	[SW4] test/exam - oral or written [SW2] presentation/project/paper/report [SW5] implementation of a problem task
	[CHEMMU2_W01] Uses knowledge of spectroscopic methods of chemical compound analysis.	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
Subject contents	<p>Theoretical bases of circular dichroism spectroscopy (CD), infrared spectroscopy (FTIR), Raman spectroscopy, absorption and fluorescence spectroscopy.</p> <p>Application of the mentioned techniques in the study of the structure of peptides and proteins.</p> <p>Methods of tracking conformational changes of peptides and proteins on selected examples.</p>		
Prerequisites and co-requisites	<p>knowledge of basic issues in the field of experimental and theoretical organic chemistry and biochemistry</p> <p>knowledge of the structure of amino acids, peptides and proteins at a basic level</p> <p>knowledge of chemical spectroscopy and physical chemistry</p>		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Presentation of the solution to a problem task	51.0%	30.0%
	Exam	51.0%	70.0%

Recommended reading	Basic literature	<p>"Spectroscopic methods for determining protein structure in solution", edited by H.A. Havel, VCH Publishers, Inc., New York, Weinheim, Cambridge 1996.</p> <p>"Vibrational spectroscopy. From theory to practice.", edited by Kamilla Małek, PWN, Warsaw 2016.</p> <p>"Biospectroscopy" Vo. 2-4, edited by Jacek Twardowski, Polish Scientific Publishers PWN, Warsaw 1989, 1990</p> <p>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.</p> <p>J.R. Lakowicz "Principles of Fluorescence Spectroscopy" wydanie 3, Springer 2006.</p>
	Supplementary literature	<p>E.A. Permyakov "Luminescent Spectroscopy of Proteins", CRC Press, Boca Raton, Ann Arbor, London Tokyo 1993.</p> <p>I.Z. Siemion "Biostereochemistry", PWN, Warsaw 1985.</p> <p>P. Crabbé, "Chiroptical methods in chemistry", Polish Scientific Publishers PWN, Warsaw 1974.</p> <p>B. Stuart "Biological applications of infrared spectroscopy", John Wiley & Sons, Chichester, New York, Weinheim, Brisbane, Singapore, Toronto 1997.</p> <p>D. Sheehan "Physical biochemistry: principles and applications", John Wiley & Sons, Chichester, New York, Weinheim, Brisbane, Singapore, Toronto 2000.</p>
	eResources addresses	<p>Basic</p> <p>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)</p>
Example issues/ example questions/ tasks being completed	<p>List the components of a spectrofluorimeter.</p> <p>Name three measurement techniques used in infrared spectroscopy (FTIR).</p> <p>Based on the presented CD spectra of proteins with unknown structures, assign each of them a dominant secondary structure type.</p> <p>List the advantages and disadvantages of Raman spectroscopy.</p>	
Work placement	Not applicable	

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