

Subject card

Subject name and code	Monographic lecture - Chemical synthesis of peptides, PG_00053612						
Field of study	Chemistry						
Date of commencement of studies	October 2025		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	2		Language of instruction		Polish		
Semester of study	3		ECTS credits		3.0		
Learning profile	academic		Assessment form		credit		
Conducting unit	Laboratory of Chemistry of Biologically Active Compounds -> Department of Molecular Biochemistry -> Faculty of Chemistry -> Rector						
Name and surname of lecturer (lecturers)	Subject supervisor		prof. dr hab. Piotr Rekowski				
	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						
	Additional information: Lecturer: prof.dr hab. Piotr Rekowski						
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	introduction students with all issues listed in the lecture program content, discussion of the nomenclature used in amino acid and peptide chemistry describe the structure of a peptide bond, familiarizing students with the basic methods of peptide bond synthesis teaching students how to design peptide synthesis						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[CHEMMU2_W01] Uses knowledge of spectroscopic methods of chemical compound analysis.	1. describes mass spectrometry and nuclear magnetic resonance analyses	[SW4] test/exam - oral or written
	[CHEMMU2_W11] Demonstrates general knowledge about the current trends in the development of chemistry as a science and the latest discoveries in this field.	1. defines the basic issues of peptide chemistry 2. names amino acid derivatives, peptides and their derivatives 3. explains the mechanisms of racemization in peptide synthesis	[SW4] test/exam - oral or written
	[CHEMMU2_W05] Has extended knowledge in the field of the specialisation studied.	1. characterizes methods of peptide bond formation 2. lists protective groups used in peptide synthesis 3. presents principles of solid-peptide synthesis	[SW4] test/exam - oral or written
	[CHEMMU2_K01] Knows the limitations of her/his own knowledge; understands the need for further education and can inspire other people to do so.	1. understands the need for continuous education, 2. appreciates the usefulness of discussions and consultations 3. is aware of the need for critical analysis of own work 4. shows creativity in searching for alternative solutions	[SK4] test/exam - oral or written
Subject contents	Lecture topics: Nomenclature used in amino acid and peptide chemistry. Peptide bond - introduction and characterization. Protective groups of amine and carboxyl, alcohol, guanidine, thiol, imidazole, indole, amide functions, introducing and removal protecting groups from these groups, orthogonality of protecting groups. Advantages and disadvantages of these protective groups. Peptide bond synthesis methods: azide, anhydride, active esters, carbodiimide, with phosphorus, uronium, enzymatic compounds. Tactics and strategy of chemical peptide synthesis. Tactics of Boc / Bzl and Fmoc / But (Trt) synthesis. Side reactions and adverse processes during peptide synthesis - prevention methods. Peptide synthesis on a solid support (Merrifield synthesis). Racemization during peptide synthesis, methods for preventing racemization.. Automation of the peptide synthesis process. Trends and news in peptide synthesis. New condensing agents, carrier resins and functional group covers. Synthesis of phosphopeptides and glycopeptides, unnatural amino acids in peptide synthesis, chemical modifications leading to more rigid peptide conformations		
Prerequisites and co-requisites	Passed exam in organic chemistry and biochemistry		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	written exam with open questions	51.0%	100.0%
Recommended reading	Basic literature	Sewald N., Jakubke H., "Peptides: chemistry and biology", (A.J. Kerstin, ed.) Elsevier 2006, M. Wiley-VCH Verlag Jones J. Amino Acid and Peptide Synthesis, Oxford University Press, 2002 Some topics will be discussed on monographic publications	
	Supplementary literature	other monographic works presenting issues contained in the lecture content of the subject	
	eResources addresses		
Example issues/ example questions/ tasks being completed	1. Design a peptide synthesis 2. Present the mechanism of peptide bond formation using the carbodiimide method using N-hydroxybenzotriazole. 3. Present the protective groups of the amino group (their introduction and the mechanism of removal from the amino group)		
Work placement	Not applicable		

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