

Subject card

Subject name and code	Graduate study lecture - Synthesis of peptides, PG_00117697						
Field of study	Chemistry						
Date of commencement of studies	October 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		dr hab. Magdalena Wysocka				
	Teachers		dr hab. Magdalena Wysocka				
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	The purpose of the course is to familiarize students with the properties of amino acids and peptides, basic covering groups used in peptide synthesis, methods of peptide bond formation, strategy and tactics of peptide synthesis.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[CHEMMU2_U02] Critically assesses the results of conducted, performed observations and theoretical calculations and discusses errors.		Describes the basic side reactions that occur during the insertion and removal of protecting groups and the cleavage of a peptide from a solid support, characteristic of certain amino acid residues or peptide sequences.		[SU4] 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.		Characterizes the basic analytical techniques used in the synthesis of peptides.		[SK4] test/exam - oral or written		
	[CHEMMU2_W05] Has extended knowledge in the field of the specialisation studied.		Describes and characterizes basic protective groups, methods of their insertion and removal, and methods of peptide bond synthesis.		[SW4] test/exam - oral or written		

Subject contents	Physical and chemical properties of amino acids. Coding (protein) and non-coding amino acids. Structure and properties of peptide bonding. Carboxyl group sheaths. Shields of the amino group. Shields of functional groups of side chains. Peptide bond formation. Preactivation and in situ activation. Classical synthesis of peptides in solution. Application of step-by-step synthesis, linking peptide fragments. Application of full synthesis of side-chain functional groups, strategy using minimal shielding of side-chain functional groups. Synthesis on solid support. Boc chemistry and Fmoc chemistry of peptide synthesis on solid support. Structure and characterization of the most commonly used carriers in peptide synthesis. Typical amino acid derivatives used in solid carrier synthesis. Selection of solid carrier. Manual, semi-automatic and automatic synthesis of peptides. Monitoring of acylation reactions in solid support synthesis. Separation of peptides from the solid carrier, their isolation and purification. Side reactions in peptide synthesis. Difficult peptide sequences and difficult amino acid residues. Designing peptide synthesis. Solving basic problems that arise during synthesis. Basic analytical techniques used to determine the amino acid composition, sequence and purity of peptides.		
Prerequisites and co-requisites	Knowledge of basic reactions in organic chemistry, basic types of organic compounds, functional groups in organic compounds and how to transform them, the concept of acidity/alkalinity in organic chemistry, knowledge of electron effects (inductive, mesomeric, superconjugation), conformation, hydrophobicity, hydrogen bonds, van der Waals dispersive and hydrophobic interactions.		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
		51.0%	100.0%
Recommended reading	Basic literature	Wysocka M., Unpublished materials shared during classes Jakubke H.D, Jeschkeit H.: Aminokwasy, peptydy białka (1989) wydanie drugie PWN, Warszawa	
	Supplementary literature	Shawn Doonan: Białka i peptydy (2008), PWN Warszawa.	
	eResources addresses		
Example issues/ example questions/ tasks being completed			
Work placement	Not applicable		

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