University of Gdańsk

Subject card

Subject name and code	Monographic lecture - Chemical synthesis of peptides, PG_00082458		
Field of study	Chemical Business		
Date of commencement of studies	February 2025	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	1	Language of instruction	Polish Polish
Semester of study	2	ECTS credits	3.0
Learning profile	academic	Assessment form	credit
Conducting unit			
Name and surname of lecturer (lecturers)	Subject supervisor	prof. dr hab. Piotr Rekowski	
	Teachers	prof. dr hab. Piotr Rekowski	

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	20.0	25.0	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
[BCHMU2_W01] Knows and understands complex physicochemical processes and is able to analyse their course in connection with other fields of science.	1. characterizes methods of peptide bond formation 2. lists protective groups used in peptide synthesis 3. presents princip	[SW3] text preparation/written work
[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.	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	[SU4] 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.	1. Is able to optimize the conditions of chemical synthesis of peptides	[SU4] test/exam - oral or written
[BCHMU2_W05] Knows and understands the main trends in the development of chemistry combined with economics as two interpenetrating scientific disciplines.	1. shows creativity in searching for alternative solutions	[SW4] test/exam - oral or written
[BCHMU2_K04] Is willing to properly assess the acquired knowledge, respect and disseminate it in order to solve specific cognitive and practical issues.	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	[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 Nhydroxybenzotriazole. 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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