University of Gdańsk

Subject card

Subject name and code	Monographic lecture - Chemical synthesis of peptides, PG_00053612		
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 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	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	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_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
[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_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_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

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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