University of Gdańsk

Subject card

Subject name and code	Monographic lecture - Synthesis methods and biochemical properties of proteins and glycoproteins, PG_00050887		
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	Faculty of Chemistry -> Rector		
Name and surname of lecturer (lecturers)	Subject supervisor	prof. dr hab. Adam Prahl	
	Teachers	prof. dr hab. Adam Prahl	

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

Introducing students to basic issues regarding the synthesis of peptides and glycopeptides. To familiarize students with the basic properties of glycopeptide peptides. Introducing students to the basics of methods used in the synthesis of glycopeptide peptides. Introducing students to methods for characterizing and analyzing peptides and glycopeptides. Developing the ability to solve problems that may arise during experiments. Developing the ability to draw conclusions from experiments and their results in order to plan subsequent tasks.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[CHEMMU2_W05] Has extended knowledge in the field of the specialisation studied.	Takes a specific position on basic chemical and biochemical issues. Knows how to use the acquired knowledge and skills in life everyday.	[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.	Knows and understands the possibilities of using peptide compounds as biologically active compounds. Knows basic databases regarding peptides. Knows modern methods of peptide synthesis. Understands the impact of various types of modifications on the properties of compounds peptide nature.	[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.	Understands the need to improve qualifications and skills using various sources.	[SK8] observation of student's independent or team work
[CHEMMU2_W01] Uses knowledge of spectroscopic methods of chemical compound analysis.	Recognizes and distinguishes techniques of identification, separation and analysis of biomolecules. Has knowledge of automation of synthesis and identification processes peptides and glycopeptides.	[SW4] test/exam - oral or written

Subject contents

Protein and non-protein amino acids - their nomenclature, classification and physicochemical properties (solubility, melting point, acid-base properties, spectroscopic properties). Shields of functional groups and side chain groups (methods of introduction and removal, orthogonality of shields). Methods of creating a peptide bond - reagents used to couple amino acid residues. Tactics and strategy of peptide synthesis. Peptide synthesis planning the use of automation and technical innovations. Peptide synthesis in solution and on a solid support. Problems related to peptide synthesis (side reactions, racemization) and methods of preventing them. Synthesis of unusual amino acids, fragments imitating peptide bonds and introduction of fragments limiting conformational freedom into peptide molecules. Review and discussion of the biochemical properties of selected natural polypeptides and glycoproteins. the role and functions of peptides, proteins and glycoproteins in the body. The use of structural X-ray imaging to determine the structures of macromolecules. The use of capillary electrophoresis to analyze and identify chemical compounds, especially peptides.

Prerequisites and co-requisites

Passed subjects: Organic Chemistry and Biochemistry.

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Written exam.	50.0%	100.0%

Recommended reading

Basic literature	H.D. Jakubke, H. Jeschkeit, Amino acids, peptides, proteins, PWN, Warsaw 1989 J. Jones, Amino Acid and Peptide Synthesis, Oxford University Press, Oxford, England 2002 S. Doonan, Proteins and peptides, PWN, Warsaw 2008 N. Sewald and H.D. Jakubke, Peptides: Chemistry and Biology, Wiley-VCH Verlag GmbH & Co. KGaA 2002 J.P. Landers, Handbook of capillary and microchip electrophoresis and associated microtechniques, CRC Press 2008
Supplementary literature	No requirements.
eResources addresses	

Example issues/ example questions/ tasks being completed

Work placement

Not applicable

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