

<b>Course title</b> Wykład monograficzny - Metody syntezy oraz właściwości biochemiczne protein i glikoprotein /Monographic lecture - Synthesis methods and biochemical properties of proteins and glycoproteins		<b>ECTS code</b> 13.3.0444	
<b>Name of unit administrating study</b> Faculty of Chemistry			
<b>Studies</b>			
<b>Field of study</b>	<b>Type</b>	<b>Form</b>	
Chemistry	Master	Full-time studies	
<b>Teaching staff</b> Prof. dr hab. Adam Prahł			
<b>Forms of classes, the realization and number of hours</b>		<b>ECTS credits</b>	
<b>A. Forms of classes, in accordance with the UG Rector's regulations</b> Lecture		30 h classes 10 h consultation 35 h student's own work	
<b>B. The realization of activities</b> Classes in the didactic room		TOTAL: 75 h - 3 ECTS	
<b>Number of hours</b> 30 h lecture			
<b>The academic cycle</b> 2020/2021 winter semester			
<b>Type of course</b> Obligatory subject		<b>Language of instruction</b> Polish	
<b>Teaching methods</b> lecture with multimedia presentation		<b>Form and method of assessment and basic criteria for evaluation or examination requirements</b>	
		<b>A. Final evaluation, in accordance with the UG study regulations</b> Course completion (with a grade)	
		<b>B. Assessment methods</b> written exam with 8-10 open questions oral exam (supplementary)	
		<b>C. The basic criteria for evaluation or exam requirements</b>  positive evaluation of the written exam, consisting of 8-10 open questions covering issues mentioned in the lecture's program	
<b>Required courses and introductory requirements</b>			
<p><b>a. Formal requirements</b> completed subject „Organic chemistry” completed subject „Biochemistry”</p> <p><b>b. Prerequisites</b>  completed subject „Organic chemistry”</p>			
<b>Aims of education</b>			
<ol style="list-style-type: none"> <li>1. introducing students to basic issues related to the synthesis of peptides and glycopeptides;</li> <li>2. making students familiar with the basic peptides and glycopeptides properties;</li> <li>3. introducing students to basics methods used to obtain peptides and glycopeptides;</li> <li>4. introducing students to methods used to characterize and analyze peptides and glycopeptides;</li> <li>5. developing of self-experimentation skills;</li> <li>6. developing skills to solve problems while conducting chemical experiments;</li> <li>7. developing skills to draw conclusions from the experiments (their results) in order to plan the next tasks.</li> </ol>			

### Course contents

Coded and non-coded amino acids - their terminology, classification and physicochemical properties (solubility, melting point, acid-base properties, spectroscopic properties). Functional moiety and side chain protecting groups (introduction and removal methods, protecting groups orthogonality). Peptide bond formation - reagents used to conjugate amino acid residues. Peptide synthesis tactic and strategy. The use of automation and technical innovations when planning peptide synthesis. Peptide synthesis in solution and on a solid support. Problems related to peptide synthesis (side reactions, racemization) and methods of their prevention. Synthesis of non-typical amino acids, peptide bond imitating fragments, and introducing into peptide molecules fragments limiting conformational freedom. Review and discussion of biochemical properties of selected polypeptides and natural glycoproteins. Role and functions of peptides, proteins and glycoproteins in organisms. The use of structural x-ray crystallography to determine the structure of macromolecules. The use of capillary electrophoresis to analyze and identify chemical compounds (in particular of a peptide nature).

### Bibliography of literature

#### A. Literature required to pass the course

H.D. Jakubke, H. Jeschkeit, Aminokwasy, peptydy, białka, PWN, Warszawa 1989

J. Jones, Amino Acid and Peptide Synthesis, Oxford University Press, Oxford, England 2002

S. Doonan, Białka i peptydy, PWN, Warszawa 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

#### B. Extracurricular readings

### Knowledge

1. knows and understands the possibilities of using peptides as biologically active compounds;
2. correctly uses the peptide chemistry terminology;
3. knows basic peptide databases;
4. recognizes and distinguishes monomers used in the peptides and glycopeptides synthesis;
5. knows methods for main and side functions protection used in peptide synthesis;
6. knows and explains main differences in the properties of protected and unprotected amino acids;
7. knows methods in peptide synthesis;
8. understands the impact of various modification on the peptide compounds properties;
9. knows and explains basic problems in peptide synthesis;
10. recognizes and distinguishes different techniques for biomolecules identification, separation and analyze;
11. has knowledge about the automation in peptides and glycopeptides synthesis.

### Social competence

1. understands the need for further education;
2. follows established procedures in laboratory work;
3. expresses specific views on basic chemical and biochemical issues;
4. is active in the use of acquired knowledge and skills in everyday life;
5. demonstrates creativity in performing individual and group tasks;
6. is careful in dealing with hazardous chemicals.