

<b>Course title</b> Zastosowanie biomolekuł w kosmetyce / Application of biomolecules in cosmetics		<b>ECTS code</b> 13.3.0508	
<b>Name of the unit administrating the study</b> Faculty of Chemistry			
<b>Studies</b>			
<b>Field of study</b>	<b>Type</b>	<b>Form</b>	
Chemistry	Bachelor	Full-time studies	
<b>Teaching staff</b> Dr hab. Sylwia Rodziewicz-Motowidło, prof. nadzw.			
<b>Forms of classes, the realization and number of hours</b>		<b>ECTS credits</b> 3	
<b>A. Forms of classes, in accordance with the UG Rector's regulations</b> lecture, laboratory class		classes - 45 h tutorial classes – 5 h student's own work – 25 h	
<b>B. The realization of activities</b> in-class learning		Total: 75 h - 3 ECTS	
<b>C. Number of hours</b> 45 (15 h lecture, 30 h laboratory class)			
<b>The academic cycle</b> Third year, winter semester			
<b>Type of course</b> obligatory		<b>Language of instruction</b> Polish	
<b>Teaching methods</b> A lecture with a multimedia presentation Performing experiments		<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> a written exam with open questions (tasks), credit with a grade	
		<b>C. The basic criteria for evaluation or exam requirements</b>  The final grade will be given based on one final test on the entire lectured subject. In the case of failing the test, the negative grade can be improved by taking another written test. The test grades will follow the guidelines set out in the "UG Study Regulations"	
<b>Required courses and introductory requirements</b> completed courses in the field of organic chemistry knowledge of the basics in the field of organic chemistry and biologically active molecules, knowledge of skin structure and physiology, knowledge and use of terminology and cosmetic nomenclature			
<b>Aims of education</b> <ul style="list-style-type: none"> <li>• Familiarizing students with all information mentioned in the lecture's curriculum,</li> <li>• Acquainting students with the function of amino acids, peptides, proteins, sugars, and lipids in human skin,</li> <li>• Familiarizing students with existing cosmetic products using amino acids, peptides, proteins, sugars, lipids, and other low-molecular biomolecules of natural origin,</li> <li>• Familiarizing students with the role of peptides, proteins as well as sugars, lipids, and DNA in the regenerative processes of the skin of the human body,</li> <li>• Familiarizing students with the structure and function of structural proteins (collagen, elastin, keratin) of the human body and the structure and function of peptides and proteins used in cosmetics (signal peptides, transport peptides, neuropeptides, silk, casein, aosain, albumin, etc.),</li> <li>• Familiarizing students with the structure and function of simple and complex sugars included in cosmetics and their derivatives (hyaluronic acid),</li> <li>• Familiarizing students with the biological function of lipids of natural origin included in cosmetics.</li> </ul>			

### Course contents

#### A. Lecture topics

- Amino acids used in cosmetics as factors stimulating the skin and human hair repair processes.
- Structure, division, and role of peptides in the human body and their use in cosmetics: relaxant peptides, transport peptides, stimulating peptides, "intelligent" peptides, peptide antibiotics.
- Peptides and their analogues used in cosmetics. The use of chemical modifications in cosmetic peptides. Phytohormones.
- Structure and biological properties of proteins that are building components of the skin, hair, and nails and proteins used in cosmetics: collagen, elastin, keratin, silk, casein, aosain, albumin.
- The structure and biological and physicochemical properties of simple and complex sugars used in cosmetics.
- The special role of hyaluronic acid in cosmetics. structure, functions, and occurrence.
- Natural lipids used in cosmetics. Structure and biological functions.

#### B. Laboratory topics

- Isolation of collagen from fish skins and its molecular characteristics as an ingredient of cosmetics
- Isolation of elastin from tendons and its characteristics
- Isolation of keratin from hair using microwave technology
- Isolation of hyaluronic acid from the ox's eye and its chemical characteristics.

### Bibliography of literature

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

- Rodziewicz-Motowidło, S., materiały niepublikowane, udostępniane studentom podczas zajęć
- A.2. studiowana samodzielnie przez studenta

#### B. Extracurricular readings

- Kamysz W, Peptydy w kosmetykach, Przemysł kosmetyczny, 2011,2,40-42.
- Gruchlik A i inni, Zastosowanie peptydów wiążących miedź w dermatologii kosmetycznej, Dermatologia Kliniczna, 2009, 11(3), 175-178.
- Opisy patentowe zagraniczne dotyczące produktów kosmetycznych. Opisy patentowe będą pochodziły ze strony: <http://www.freepatentsonline.com/>
- Metody wypełniania tkanek miękkich stosowane w kosmologii. ELSEVIER, Red. Jeffrey S. Dover, Murald Alam
- Barba C. i inni, Skin Research and Technology, 14, 243–248, 2008
- Fields K. i inni, Journal of Cosmetic dermatology, 8, 8-13, 2009
- Gorouhi F. i Maibach H.I., International journal of cosmetic Science, 31, 327-345, 2009
- Gruchlik A. i inni, Dermatologia Kliniczna, 11(3), 175-178, 2009
- Kerscher M. i Buntrock H., Journal of German Society of Dermatology, 9, 314-328, 2011
- Lupo M. P. i Cole A.L. Dermatologic Therapy, 20, 343–349, 2007
- Puig A. i inni, International Journal of Cosmetic Science, 30, 97–104, 2008
- Schurink M.i inni, Peptides, 28, 485 – 495, 2007
- Zhang L. i Falla T.J., Clinics in Dermatology, 27, 485-494, 2009.

### Knowledge

- Identifies amino acids used in cosmetics
- Describes the importance of amino acids, peptides, sugars, and lipids used in cosmetic products
- Explains the biological action of peptides, proteins, sugars, and lipids in human skin,
- Identifies and recognizes the structure of structural proteins and complex sugars
- Describes types of cosmetic peptides, types of sugars and lipids used in cosmetics
- Distinguishes and divides into classes biomolecules used in cosmetics,
- Characterizes processes occurring in the skin under the influence of amino acids, peptides, proteins, sugars, and lipids.
- Draws simple conclusions on the activity of biomolecules in cosmetics for human skin

### Skills

- Classifies the basic biochemical processes occurring in the human skin with the participation of biomolecules
- Distinguishes the composition of a cosmetic product containing amino acids, peptides, proteins, sugars, and lipids.
- Can propose a chemical modification of the biomolecule so that it brings the right cosmetic effect
- Works on exploring chemical literature and world patents

### Social competence

- Understands the need for systematic familiarization with the latest chemical literature
- Is active in the broadening of knowledge and understands the need for continuous education in the field of the latest biomolecules used in cosmetic products
- Understands the need to become acquainted with scientific and popular science magazines, basic in the field of chemistry of biomolecules used in cosmetic products, to broaden and deepen knowledge