

**Subject card**

|   |   |  |  |                                     |   |            |     |
|---|---|--|--|-------------------------------------|---|------------|-----|
| Subject name and code                       | Application of biomolecules in cosmetics, PG_00082057   |  |  |                                     |   |            |     |
| Field of study                              | Chemistry   |  |  |                                     |   |            |     |
| Date of commencement of studies             | October 2024  | Academic year of realisation of subject                  |  |                                     | 2026/2027   |            |     |
| Education level                             | Bachelor's studies  | Subject group  |  |                                     | Obligatory subject group in the field of study  |            |     |
| Mode of study                               | full-time studies   | Mode of delivery   |  |                                     | at the university   |            |     |
| Year of study                               | 3   | Language of instruction                                  |  |                                     | Polish  |            |     |
| Semester of study                           | 5   | ECTS credits   |  |                                     | 1.0   |            |     |
| Learning profile                            | academic  | Assessment form  |  |                                     | credit  |            |     |
| Conducting unit                             | Laboratory of Medical Chemistry -> Department of Biomedical Chemistry -> Faculty of Chemistry -> Rector   |  |  |                                     |   |            |     |
| Name and surname of lecturer (lecturers)    | Subject supervisor  |  | dr Julia Witkowska   |                                     |   |            |     |
|   | Teachers  |  |  |                                     |   |            |     |
| Lesson types                                | Lesson type   | Lecture  | Tutorial   | Laboratory                          | Project   | Seminar    | SUM |
|   | Number of study hours   | 15.0   | 0.0  | 0.0                                 | 0.0   | 0.0        | 15  |
|   | 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   | 15   |  | 2.0                                 |   | 8.0        | 25  |
| Subject objectives                          | <p>To acquaint students:</p> <ul style="list-style-type: none"> <li>with the structure of the skin</li> <li>with the functions of lipids, amino acids, peptides, proteins, sugars and their derivatives (hyaluronic acid) in human skin,</li> <li>with existing cosmetic products containing amino acids, peptides, proteins, sugars, lipids and other small-molecule biomolecules of natural origin,</li> <li>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 (signaling and transport peptides, neuropeptides, silk, casein, aosain, albumin, etc.).</li> </ul> |  |  |                                     |   |            |     |
| Learning outcomes                           | Course outcome  |  | Subject outcome  |                                     | Method of verification  |            |     |
|   | [CHEML3_U08] Presents in an understandable way the basic facts about chemistry using a scientific language typical of chemical sciences.  |  | The student clearly explains and presents the knowledge acquired during the lecture.   |                                     | [SU1] oral statement/conversation/discussion<br>[SU4] test/exam - oral or written   |            |     |
|   | [CHEML3_K01] Identifies the level of her/his own knowledge and skills and the need for continuous learning and personal development.  |  | The student demonstrates independence in developing issues in the field by using available literature and scientific articles. |                                     | [SK1] oral statement/conversation/discussion<br>[SK4] test/exam - oral or written<br>[SK5] implementation of a problem task |            |     |
|   | [CHEML3_W03] Explains the relationship between the structure of matter and its observed properties.   |  | The student uses the acquired theoretical knowledge.   |                                     | [SW4] test/exam - oral or written<br>[SW1] oral statement/conversation/discussion   |            |     |
|   | [CHEML3_W05] Has basic knowledge of the chemical specialisation studied.  |  | The student has knowledge about the function and structure of amino acids, peptides and proteins used in cosmetic chemistry.   |                                     | [SW4] test/exam - oral or written<br>[SW1] oral statement/conversation/discussion   |            |     |

|  |  |   |                               |
|--|--|---|-------------------------------|
| Subject contents   | Amino acids used in cosmetics as factors stimulating the repair processes of human skin and hair. Structure, division and role of peptides in the human body and their use in cosmetics: relaxing peptides, transporting peptides, stimulating peptides, "smart" peptides, peptide antibiotics. The use of chemical modifications in cosmetic peptides. Structure and biological properties of proteins that are the building blocks of skin, hair and nails, as well as proteins used in cosmetics: collagen, elastin, keratin, silk, casein, aosain, albumin. 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. Lipids of natural origin used in cosmetics. Structure and biological functions. |   |                               |
| Prerequisites and co-requisites                          |  |   |                               |
| Assessment methods and criteria                          | Subject passing criteria   | Passing threshold   | Percentage of the final grade |
|  | test exam with open questions  | 51.0%   | 100.0%                        |
| Recommended reading                                      | Basic literature   | <p>Xian Jun Loh, <i>Polymers for Personal Care Products and Cosmetics (Polymer Chemistry Series)</i>, Volume 20, Royal Society of Chemistry</p> <p>G. Baki and Gabriella. Baki, <i>Introduction to cosmetic formulation and technology</i>. John Wiley and Sons Ltd, 2022. Accessed: Jun. 13, 2024</p> <p>L. Dai and I. Hansenne-Cervantes, Protein-Based Materials in Cosmetics, <i>Handbook of the Extracellular Matrix</i>, pp. 123, 2023, doi: 10.1007/978-3-030-92090-6_18-1.</p> <p>G. Secchi, Role of protein in cosmetics, <i>Clin Dermatol</i>, vol. 26, no. 4, pp. 321325, 2008, doi: 10.1016/J.CLINDERMATOL.2008.04.004.</p> |                               |
|  | Supplementary literature   | <p>M. Molski, <i>Chemia Piękna Tom 1</i>. Warszawa: Wydawnictwo Naukowe PWN, 2021. Accessed: Jun. 13, 2024</p> <p>A. Marzec, <i>Chemia nowoczesnych kosmetyków - Substancje aktywne w preparatach i zabiegach kosmetycznych - Marzec</i>, I. Dom Organizatora TNOiK, 2010.</p>  |                               |
|  | eResources addresses   |   |                               |
| Example issues/ example questions/ tasks being completed | Skin structure. Skin aging processes. Structural proteins of the skin. Amino acids and peptides used in cosmetic chemistry. Smart peptides. Protein hydrolysates.  |   |                               |
| Work placement   | Not applicable   |   |                               |

Document generated electronically. Does not require a seal or signature.