



## Subject card

|                                             |                                                                                                                                                                                                                                                                                                        |                                                          |                                                                                                                                                                                                                                                                                                   |                                     |                                                                                                                                                   |            |     |
|---------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|------------|-----|
| Subject name and code                       | Biopolymers in cosmetology, PG_00060783                                                                                                                                                                                                                                                                |                                                          |                                                                                                                                                                                                                                                                                                   |                                     |                                                                                                                                                   |            |     |
| Field of study                              | Chemical Technology                                                                                                                                                                                                                                                                                    |                                                          |                                                                                                                                                                                                                                                                                                   |                                     |                                                                                                                                                   |            |     |
| Date of commencement of studies             | October 2024                                                                                                                                                                                                                                                                                           |                                                          | Academic year of realisation of subject                                                                                                                                                                                                                                                           |                                     | 2026/2027                                                                                                                                         |            |     |
| Education level                             | first-cycle studies                                                                                                                                                                                                                                                                                    |                                                          | Subject group                                                                                                                                                                                                                                                                                     |                                     | Optional subject group<br>Subject group related to scientific research 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                           | 6                                                                                                                                                                                                                                                                                                      |                                                          | ECTS credits                                                                                                                                                                                                                                                                                      |                                     | 2.0                                                                                                                                               |            |     |
| Learning profile                            | general academic profile                                                                                                                                                                                                                                                                               |                                                          | Assessment form                                                                                                                                                                                                                                                                                   |                                     | assessment                                                                                                                                        |            |     |
| Conducting unit                             | Department of Polymer Technology -> Faculty of Chemistry -> Faculties of Gdańsk University of Technology                                                                                                                                                                                               |                                                          |                                                                                                                                                                                                                                                                                                   |                                     |                                                                                                                                                   |            |     |
| Name and surname of lecturer (lecturers)    | Subject supervisor                                                                                                                                                                                                                                                                                     |                                                          | dr inż. Maciej Sienkiewicz                                                                                                                                                                                                                                                                        |                                     |                                                                                                                                                   |            |     |
|                                             | Teachers                                                                                                                                                                                                                                                                                               |                                                          |                                                                                                                                                                                                                                                                                                   |                                     |                                                                                                                                                   |            |     |
| Lesson types                                | Lesson type                                                                                                                                                                                                                                                                                            | Lecture                                                  | Tutorial                                                                                                                                                                                                                                                                                          | Laboratory                          | Project                                                                                                                                           | Seminar    | SUM |
|                                             | Number of study hours                                                                                                                                                                                                                                                                                  | 15.0                                                     | 0.0                                                                                                                                                                                                                                                                                               | 15.0                                | 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                                                       |                                                                                                                                                                                                                                                                                                   | 2.0                                 |                                                                                                                                                   | 18.0       | 50  |
| Subject objectives                          | The aim of the course is to familiarize students with the types, properties and applications of biopolymers in cosmetology.                                                                                                                                                                            |                                                          |                                                                                                                                                                                                                                                                                                   |                                     |                                                                                                                                                   |            |     |
| Learning outcomes                           | Course outcome                                                                                                                                                                                                                                                                                         |                                                          | Subject outcome                                                                                                                                                                                                                                                                                   |                                     | Method of verification                                                                                                                            |            |     |
|                                             | [K6_U03] is able to apply knowledge of inorganic, organic, physical and analytical chemistry and identify appropriate sources of information to design and synthesize simple chemical compounds, carry out basic physicochemical and analytical measurements                                           |                                                          | The student is able to use knowledge of inorganic, organic, physical and analytical chemistry to obtain and characterize cosmetic and medical products containing protein and saccharide biopolymers.                                                                                             |                                     | [SU1] Assessment of task fulfilment<br>[SU2] Assessment of ability to analyse information<br>[SU4] Assessment of ability to use methods and tools |            |     |
|                                             | [K6_W09] has knowledge of the technological and functional properties of polymers, the physical basis and processing methods of polymers and rubber                                                                                                                                                    |                                                          | Student has the knowledge necessary to describe in detail the types, properties, functions, and applications of biopolymers in cosmetology and aesthetic medicine.                                                                                                                                |                                     | [SW1] Assessment of factual knowledge                                                                                                             |            |     |
|                                             | [K6_K05] is aware of the social role of a technical university graduate, and in particular understands the need to formulate and communicate to the public, in particular through the mass media, information and opinions on the achievements of technology and other aspects of engineering activity |                                                          | Students are aware of the impact of synthetic materials on human health and life, particularly in the area of biopolymers' use in cosmetology. Students can describe the types and applications of biopolymers in cosmetology and aesthetic medicine in a scientific and popular science context. |                                     | [SK2] Assessment of progress of work<br>[SK4] Assessment of communication skills, including language correctness                                  |            |     |

|                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                             |                               |
|----------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|
| Subject contents                                               | <p>Course content – lecture</p> <ul style="list-style-type: none"><li>• Definition and classification of biopolymers used in cosmetology</li><li>• Polysaccharides (e.g., starch, cellulose and its derivatives, agar) - properties, functions, and applications in cosmetology</li><li>• Proteins (e.g., gelatin, collagen, elastin) - properties, functions, and applications in cosmetology</li><li>• Latest trends in the use of biopolymers in cosmetology and aesthetic medicine</li></ul> <p>Course content – laboratory</p> <ul style="list-style-type: none"><li>• Preparation of multilayer hybrid dressings using 3D printing (FDM, SLA)</li><li>• Preparation of active ingredient carriers using various techniques, including SC/PL, casting, and soaking</li><li>• Preparation of polymer hydrogels based on various biopolymers</li><li>• Studying the physicochemical and mechanical properties (including microscopic examination) of biopolymer materials</li><li>• Preparation of polymer microcapsules as active ingredient carriers</li></ul> |                                                                                                                                                                                                                                                                                                                                                                                             |                               |
| Prerequisites and co-requisites                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                             |                               |
| Assessment methods and criteria                                | Subject passing criteria                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Passing threshold                                                                                                                                                                                                                                                                                                                                                                           | Percentage of the final grade |
|                                                                | laboratory (entry tests, reports, attendance and activity)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 60.0%                                                                                                                                                                                                                                                                                                                                                                                       | 50.0%                         |
|                                                                | lecture (written test)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 60.0%                                                                                                                                                                                                                                                                                                                                                                                       | 50.0%                         |
| Recommended reading                                            | Basic literature                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <ul style="list-style-type: none"><li>• M. Molski: Chemia piękna, Tom 1 i 2, PWN, Warszawa 2021</li><li>• J.F. Rabek: Współczesna wiedza o polimerach. Tom 1: Budowa strukturalna polimerów i metody badawcze, PWN, Warszawa 2017</li><li>• J.F. Rabek: Współczesna wiedza o polimerach. Tom 2: Polimery naturalne i syntetyczne, otrzymywanie i zastosowania, PWN, Warszawa 2017</li></ul> |                               |
|                                                                | Supplementary literature                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <ul style="list-style-type: none"><li>• J.F. Rabek: Polimery i ich zastosowania interdyscyplinarne, Tom 1 i 2, PWN, Warszawa 2021</li></ul>                                                                                                                                                                                                                                                 |                               |
|                                                                | eResources addresses                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                             |                               |
| Example issues/<br>example questions/<br>tasks being completed | <ul style="list-style-type: none"><li>• Polymers Used in Cosmetology and Aesthetic Medicine</li><li>• Types, Properties, and Applications of Saccharide Biopolymers in Cosmetology</li><li>• Types, Properties, and Applications of Protein Biopolymers in Cosmetology</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                             |                               |
| Practical activities within the subject                        | Not applicable                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                             |                               |

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