



## Subject card

|   |  |  |   |                                     |  |            |     |
|---|--|--|---|-------------------------------------|--|------------|-----|
| Subject name and code                       | Biochemistry, PG_00047752  |  |   |                                     |  |            |     |
| Field of study                              | Biomedical Engineering   |  |   |                                     |  |            |     |
| Date of commencement of studies             | October 2023   |  | Academic year of realisation of subject |                                     | 2024/2025                                      |            |     |
| Education level                             | first-cycle 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                               | 2  |  | Language of instruction                 |                                     | Polish   |            |     |
| Semester of study                           | 3  |  | ECTS credits                            |                                     | 4.0  |            |     |
| Learning profile                            | general academic profile   |  | Assessment form                         |                                     | assessment                                     |            |     |
| Conducting unit                             | Department of Pharmaceutical Technology and Biochemistry -> Faculty of Chemistry   |  |   |                                     |  |            |     |
| Name and surname of lecturer (lecturers)    | Subject supervisor   |  | prof. dr hab. inż. Sławomir Milewski    |                                     |  |            |     |
|   | Teachers   |  | dr inż. Kamila Rząd                     |                                     |  |            |     |
|   |  |  | prof. dr hab. inż. Sławomir Milewski    |                                     |  |            |     |
| Lesson types and methods of instruction     | Lesson type  | Lecture  | Tutorial                                | Laboratory                          | Project  | Seminar    | SUM |
|   | Number of study hours  | 30.0   | 0.0                                     | 15.0                                | 0.0  | 0.0        | 45  |
|   | 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  | 45   |   | 3.0                                 |  | 52.0       | 100 |
| Subject objectives                          | The main purpose of this course is gaining knowledge about the structure and role of components of the living cells, including proteins, nucleic acids, polysaccharides and lipids and the main pathways of cellular metabolism. |  |   |                                     |  |            |     |

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| Learning outcomes  | Course outcome   | Subject outcome   | Method of verification                               |
|  | [K6_U05] can plan and conduct experiments related to the field of study, including computer simulations and measurements; interpret obtained results and draw conclusions  | The student knows the basic principles of planning and conducting experimental work in the field of biochemistry and is able to analyze experimental data.  | [SU4] Assessment of ability to use methods and tools |
|  | [K6_W03] knows and understands, to an advanced extent, the construction and operating principles of components and systems related to the field of study, including theories, methods and complex relationships between them and selected specific issues - appropriate for the curriculum   | The student knows the basic principles of biomacromolecule structure.   | [SW1] Assessment of factual knowledge                |
|  | [K6_W02] knows and understands, to an advanced extent, selected laws of physics and physical phenomena as well as methods and theories explaining the complex relationships between them, constituting the basic general knowledge in the field of technical sciences related to the field of study  | The student knows the physical and biochemical foundations of biocatalysis.   | [SW1] Assessment of factual knowledge                |
|  | [K6_W52] Knows and understands, to an advanced extent, selected aspects of chemistry and biochemistry, constituting general knowledge related to the field of study  | Student knows the main metabolic pathways and is able to estimate the consequences of metabolic disorders   | [SW1] Assessment of factual knowledge                |
|  | [K6_U51] can conduct laboratory work connected with chemistry and biochemistry, specific to biomedical engineering   | The student knows the basic laboratory techniques in the field of biochemistry and is able to analyze experimental data.  | [SW1] Assessment of factual knowledge                |
| Subject contents   | 1. Structure of prokaryotic and eukaryotic cells<br>2. Biomolecules - aminoacids, peptides and proteins<br>3. Biomolecules - sugars and polysaccharides<br>4. Biomolecules - lipids. Structure of biological membranes<br>5. Biomolecules - nucleic acids<br>6. Enzymes - structure, mechanisms of action and regulation<br>7. Main catabolic pathways - glycolysis, Krebs cycle, respiratory chain, fatty acids oxidation<br>8. Examples of anabolic pathways<br>9. Energetic coupling of metabolism. High-energy compounds<br>10. Integration and control of metabolic pathways<br>11. Genetic information and its transfer. Genetic code<br>12. DNA replication<br>13. Mutations in DNA. Mechanisms of mutagenesis and DNA repair<br>14. Etiology of hereditary metabolic diseases<br>15. Transcription<br>16. Protein biosynthesis. Role of chaperones<br>17. Biochemistry of selected physiological processes<br>18. Recombinant DNA technology<br>19. Biological and biochemical basis of tissue engineering |   |  |
| Prerequisites and co-requisites                                | Knowledge of the selected topics of general chemistry: chemical bonds; intermolecular interactions, types and mechanisms of chemical reactions, properties of water, aqueous solutions, colloidal solutions.<br>Knowledge of the selected topics of organic and physical chemistry: organic compounds - types and reactivity; theory of catalysis, thermodynamics and reaction kinetics  |   |  |
| Assessment methods and criteria                                | Subject passing criteria   | Passing threshold   | Percentage of the final grade                        |
|  | Written test II  | 50.0%   | 50.0%  |
|  | Written test I   | 50.0%   | 50.0%  |
| Recommended reading  | Basic literature   | D.B. Hames, N.M. Hooper, Biochemia. Krótkie wykłady, PWN W-wa 2007  |  |
|  | Supplementary literature   | J.M. Berg, L. Stryer, J. Tymoczko, Biochemia, PWN W-wa, 2007  |  |
|  | eResources addresses   | Adresy na platformie eNauczanie:<br>Biochemia - Moodle ID: 40094<br><a href="https://enauzanie.pg.edu.pl/moodle/course/view.php?id=40094">https://enauzanie.pg.edu.pl/moodle/course/view.php?id=40094</a> |  |
| Example issues/<br>example questions/<br>tasks being completed |  |   |  |
| Work placement   | Not applicable   |   |  |

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