

## Subject card

|                                             |                                                                                                                                                                                                                                                                                                                |                                                          |                                         |                                     |         |                                                                                                                      |     |
|---------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|-----------------------------------------|-------------------------------------|---------|----------------------------------------------------------------------------------------------------------------------|-----|
| Subject name and code                       | Biochemistry, PG_00103519                                                                                                                                                                                                                                                                                      |                                                          |                                         |                                     |         |                                                                                                                      |     |
| Field of study                              | Environmental Protection                                                                                                                                                                                                                                                                                       |                                                          |                                         |                                     |         |                                                                                                                      |     |
| Date of commencement of studies             | October 2025                                                                                                                                                                                                                                                                                                   |                                                          | Academic year of realisation of subject |                                     |         | 2027/2028                                                                                                            |     |
| Education level                             | Bachelor's studies                                                                                                                                                                                                                                                                                             |                                                          | Subject group                           |                                     |         | Obligatory subject group in the field of study<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                           | 5                                                                                                                                                                                                                                                                                                              |                                                          | ECTS credits                            |                                     |         | 2.0                                                                                                                  |     |
| Learning profile                            | academic                                                                                                                                                                                                                                                                                                       |                                                          | Assessment form                         |                                     |         | credit                                                                                                               |     |
| Conducting unit                             | Laboratory of Bioorganic Chemistry -> Department of Molecular Biochemistry -> Faculty of Chemistry -> Rector                                                                                                                                                                                                   |                                                          |                                         |                                     |         |                                                                                                                      |     |
| Name and surname of lecturer (lecturers)    | Subject supervisor                                                                                                                                                                                                                                                                                             |                                                          | prof. dr hab. Krzysztof Rolka           |                                     |         |                                                                                                                      |     |
|                                             | Teachers                                                                                                                                                                                                                                                                                                       |                                                          |                                         |                                     |         |                                                                                                                      |     |
| Lesson types                                | Lesson type                                                                                                                                                                                                                                                                                                    | Lecture                                                  | Tutorial                                | Laboratory                          | Project | Seminar                                                                                                              | SUM |
|                                             | Number of study hours                                                                                                                                                                                                                                                                                          | 0.0                                                      | 0.0                                     | 30.0                                | 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                                                       |                                         | 5.0                                 |         | 15.0                                                                                                                 | 50  |
| Subject objectives                          | To teach students how to perform biochemical experiments using provided instructions.To introduce students to the basic endogenous organic compounds, their structure and functions. To develop the ability to critically asses and interpret obtained experimental results and analysis of scientificsources. |                                                          |                                         |                                     |         |                                                                                                                      |     |

| Learning outcomes               | Course outcome                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Subject outcome                                                                                                                                                                                                                                                                                                                                                                     | Method of verification                                                                                                                                                               |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                 | [OŚL3_K08] Is responsible for and takes care of the specialist equipment entrusted to her/him for research and laboratory or field work.                                                                                                                                                                                                                                                                                                                            | Takes care of the assigned laboratory equipment.<br>Exercises due caution when using laboratory equipment and working with chemical reagents.<br>Appreciates the need to be able to work in a team in accordance with one's role in it (group leader/group member).                                                                                                                 | [SK2] presentation/project/paper/report<br>[SK3] text preparation/written work<br>[SK6] demonstration of practical skills<br>[SK8] observation of student's independent or team work |
|                                 | [OŚL3_K05] Identifies the level of her/his knowledge and skills, demonstrates the need to update knowledge about the environment and its protection, demonstrates the need for continuous professional training and personal development.                                                                                                                                                                                                                           | Understands the need for continuous education.                                                                                                                                                                                                                                                                                                                                      | [SK2] presentation/project/paper/report<br>[SK3] text preparation/written work<br>[SK6] demonstration of practical skills<br>[SK8] observation of student's independent or team work |
|                                 | [OŚL3_U07] Uses basic laboratory techniques, conducts field research and performs qualitative and quantitative analyses and draws conclusions on this basis for practical purposes.                                                                                                                                                                                                                                                                                 | Uses basic analytical techniques used in analysis endogenous organic compounds.                                                                                                                                                                                                                                                                                                     | [SU2] presentation/project/paper/report<br>[SU6] demonstration of practical skills<br>[SU8] observation of student's independent or team work                                        |
|                                 | [OŚL3_W01] Discusses the basic concepts of mathematics, physics, chemistry and biology. Describes physical, chemical and biological phenomena occurring in nature as well as geological, geomorphological and climatic conditions of the functioning of nature.                                                                                                                                                                                                     | Defines and presents the chemical structure of basic groups of bio- and macromolecules.<br>Characterizes selected methods of analysis of endogenous organic compounds, describes and explains their importance for the functioning of the body.<br>Characterizes methods for determining the enzymatic activity of selected proteinases.<br>Recognizes basic laboratory equipment). | [SW1] oral statement/conversation/discussion<br>[SW2] presentation/project/paper/report                                                                                              |
|                                 | [OŚL3_U02] Plans, selects appropriate research and measuring equipment and devices, performs physicochemical measurements and experiments; analyses the results and draws conclusions based on them.                                                                                                                                                                                                                                                                | Designs and performs simple biochemical experiments, selecting laboratory equipment according to its purpose.<br>Analyzes and interprets the results of experiments and draws conclusions regarding the correctness of their course.                                                                                                                                                | [SU2] presentation/project/paper/report<br>[SU3] text preparation/written work<br>[SU6] demonstration of practical skills<br>[SU8] observation of student's independent or team work |
|                                 | [OŚL3_U11] Uses statistical methods as well as algorithms and IT techniques, including application software packages to describe environmental experiments and analysis of typical data in socio-economic activities based on science and natural sciences.                                                                                                                                                                                                         | Uses chemical terminology to the extent necessary to present (in written and oral form) the course content.<br>Predicts the physicochemical and biological properties of organic compounds based on their chemical formulas.                                                                                                                                                        | [SU2] presentation/project/paper/report<br>[SU3] text preparation/written work<br>[SU6] demonstration of practical skills<br>[SU8] observation of student's independent or team work |
| Subject contents                | <p>Performing five exercises/experiments covering the following topics: activity marking enzymatic analysis of serine proteinases and their inhibitors and chromogenic substrates, determination of kinetic parameters of a selected chromogenic substrate, use of molecular filtration chromatography for protein analysis, chromatographic analysis of phospholipids, testing of the susceptibility of polysaccharides to hydrolysis under low pH conditions.</p> |                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                      |
| Prerequisites and co-requisites | Organic chemistry at the bachelor level, ability to work in a chemical laboratory, knowledge of basic laboratory glassware, learning the principles of work in a biochemical laboratory                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                      |
| Assessment methods and criteria | Subject passing criteria                                                                                                                                                                                                                                                                                                                                                                                                                                            | Passing threshold                                                                                                                                                                                                                                                                                                                                                                   | Percentage of the final grade                                                                                                                                                        |
|                                 | passing five entrance tests, positive assessment of laboratory reports and assessment of student's laboratory work                                                                                                                                                                                                                                                                                                                                                  | 51.0%                                                                                                                                                                                                                                                                                                                                                                               | 100.0%                                                                                                                                                                               |

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| Recommended reading                                            | Basic literature                                                                                                                                                 | Instructions for laboratory exercises prepared by the Department's employees are available in electronic form on the Faculty's website.       |
|                                                                | Supplementary literature                                                                                                                                         | J. M. Berg, J. L. Tymoczko, L. Stryer, Biochemia, PWN, Warszawa 2009 and subsequent editions, also other academic textbooks for biochemistry. |
|                                                                | eResources addresses                                                                                                                                             |                                                                                                                                               |
| Example issues/<br>example questions/<br>tasks being completed | Discuss the types of column liquid chromatography used in the analysis of biomolecules. Describe the method of determining trypsin activity used during classes. |                                                                                                                                               |
| Work placement                                                 | Not applicable                                                                                                                                                   |                                                                                                                                               |

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