

## Subject card

|                                             |                                                                                                                                                                                                                                                                                            |                                                          |                                                                                                                                                           |                                     |                                                                                                                                        |            |     |
|---------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|------------|-----|
| Subject name and code                       | Statistics with elements of mathematics in biological sciences, PG_00142890                                                                                                                                                                                                                |                                                          |                                                                                                                                                           |                                     |                                                                                                                                        |            |     |
| Field of study                              | Natural Resources Conservation                                                                                                                                                                                                                                                             |                                                          |                                                                                                                                                           |                                     |                                                                                                                                        |            |     |
| Date of commencement of studies             | October 2025                                                                                                                                                                                                                                                                               |                                                          | Academic year of realisation of subject                                                                                                                   |                                     | 2026/2027                                                                                                                              |            |     |
| 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                               | 2                                                                                                                                                                                                                                                                                          |                                                          | Language of instruction                                                                                                                                   |                                     | Polish                                                                                                                                 |            |     |
| Semester of study                           | 3                                                                                                                                                                                                                                                                                          |                                                          | ECTS credits                                                                                                                                              |                                     | 3.0                                                                                                                                    |            |     |
| Learning profile                            | academic                                                                                                                                                                                                                                                                                   |                                                          | Assessment form                                                                                                                                           |                                     | credit                                                                                                                                 |            |     |
| Conducting unit                             | Laboratory of Plant Physiology and Toxicology -> Department of Experimental Biology and Plant Biotechnology -> Faculty of Biology -> Rector                                                                                                                                                |                                                          |                                                                                                                                                           |                                     |                                                                                                                                        |            |     |
| Name and surname of lecturer (lecturers)    | Subject supervisor                                                                                                                                                                                                                                                                         |                                                          | dr Agnieszka Baścik-Remisiewicz                                                                                                                           |                                     |                                                                                                                                        |            |     |
|                                             | Teachers                                                                                                                                                                                                                                                                                   |                                                          |                                                                                                                                                           |                                     |                                                                                                                                        |            |     |
| Lesson types                                | Lesson type                                                                                                                                                                                                                                                                                | Lecture                                                  | Tutorial                                                                                                                                                  | Laboratory                          | Project                                                                                                                                | Seminar    | SUM |
|                                             | Number of study hours                                                                                                                                                                                                                                                                      | 0.0                                                      | 30.0                                                                                                                                                      | 0.0                                 | 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                                                       |                                                                                                                                                           | 8.0                                 |                                                                                                                                        | 37.0       | 75  |
| Subject objectives                          | 1. To prepare students to use basic methods of statistical analysis and to apply them in the interpretation of biological phenomena and processes.<br><br>2. To acquaint students with the tools of mathematics necessary to understand the laws of nature and to describe life processes. |                                                          |                                                                                                                                                           |                                     |                                                                                                                                        |            |     |
| Learning outcomes                           | Course outcome                                                                                                                                                                                                                                                                             |                                                          | Subject outcome                                                                                                                                           |                                     | Method of verification                                                                                                                 |            |     |
|                                             | [OZPL3_W08] The graduate possesses advanced knowledge and understanding of data analysis tools required to comprehend natural laws and describe biological processes                                                                                                                       |                                                          | The graduate know and understand the tools of mathematics and statistics necessary to understand the laws of nature and to describe biological processes. |                                     | [SW4] test/exam - oral or written<br>[SW5] implementation of a problem task                                                            |            |     |
|                                             | [OZPL3_K01] The graduate is ready to recognise the limitations in his/her own knowledge and understands the need for continuous learning and development                                                                                                                                   |                                                          | The graduate is ready to recognise the imitations in his/her own knowledge and understand the need for continuous learning and development.               |                                     | [SK8] observation of student's independent or team work                                                                                |            |     |
|                                             | [OZPL3_W12] The graduate possesses knowledge of statistical methods and IT tools relevant to the field of study.                                                                                                                                                                           |                                                          | The graduate has knowledge of the use of statistical methods in the field related to the field of study.                                                  |                                     | [SW4] test/exam - oral or written<br>[SW5] implementation of a problem task                                                            |            |     |
|                                             | [OZPL3_U05] The graduate is able to apply basic statistical methods and computer techniques and tools to describe phenomena and analyse biological data                                                                                                                                    |                                                          | The graduate is able to apply basic statistical and mathematical methods to describe phenomena and analysis of biological data.                           |                                     | [SU4] test/exam - oral or written<br>[SU5] implementation of a problem task<br>[SU8] observation of student's independent or team work |            |     |

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|----------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|
| Subject contents                                               | Examples of practical application of selected statistical and mathematical methods covered in the lecture topics.<br><br><b>Statistics:</b> Basic concepts of statistics (types of variables, principles of number approximation). Descriptive statistics: sample size, arithmetic mean, variance, standard deviation, standard error. Binomial and normal distributions. Statistical hypothesis testing. Homogeneity of variance (Snedecor's F test). Student's t-test. One-way analysis of variance.<br><br><b>Mathematics:</b> Introduction to the calculus of probability. Number sequences. Derivative of a function and its application. Integral calculus of functions of one variable: the indeterminate and determinate integral, methods of calculating integrals and their application. |                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                               |
| Prerequisites and co-requisites                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                               |
| Assessment methods and criteria                                | Subject passing criteria                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Passing threshold                                                                                                                                                                                                                                                                                                                                                                                                                                | Percentage of the final grade |
|                                                                | mathematics exam                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 51.0%                                                                                                                                                                                                                                                                                                                                                                                                                                            | 40.0%                         |
|                                                                | statistics exam                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 51.0%                                                                                                                                                                                                                                                                                                                                                                                                                                            | 60.0%                         |
| Recommended reading                                            | Basic literature                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Baścik-Remisiewicz A., Chincinska I., Miklaszewska M. 2020. Wybrane zagadnienia ze statystyki i matematyki. Przewodnik do ćwiczeń dla studentów biologii. Wydawnictwo Uniwersytetu Gdańskiego<br><br>Łomnicki A. 2014. (lub wydania wcześniejsze). Wprowadzenie do statystyki dla przyrodników. PWN, Warszawa.<br><br>Krysicki W., Włodarski L. 2015. (lub wydania wcześniejsze). Analiza matematyczna w zadaniach. Część I i II. PWN, Warszawa. |                               |
|                                                                | Supplementary literature                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Wrzosek D. 2010. (lub wydania wcześniejsze). Matematyka dla biologów. Wydawnictwo Uniwersytetu Warszawskiego.                                                                                                                                                                                                                                                                                                                                    |                               |
|                                                                | eResources addresses                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                               |
| Example issues/<br>example questions/<br>tasks being completed |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                               |
| Work placement                                                 | Not applicable                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                               |

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