

## Subject card

|                                             |                                                                                                                                                                                                                                                   |                                                          |                                         |                                     |                                                                                                                                                |            |     |
|---------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|-----------------------------------------|-------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|------------|-----|
| Subject name and code                       | Water monitoring, PG_00119876                                                                                                                                                                                                                     |                                                          |                                         |                                     |                                                                                                                                                |            |     |
| Field of study                              | Geography                                                                                                                                                                                                                                         |                                                          |                                         |                                     |                                                                                                                                                |            |     |
| 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>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                 |                                     | English                                                                                                                                        |            |     |
| Semester of study                           | 5                                                                                                                                                                                                                                                 |                                                          | ECTS credits                            |                                     | 3.0                                                                                                                                            |            |     |
| Learning profile                            | academic                                                                                                                                                                                                                                          |                                                          | Assessment form                         |                                     | credit                                                                                                                                         |            |     |
| Conducting unit                             | Centrum Monitoringu i Ochrony Wód -> Faculty of Oceanography and Geography -> Rector                                                                                                                                                              |                                                          |                                         |                                     |                                                                                                                                                |            |     |
| Name and surname of lecturer (lecturers)    | Subject supervisor                                                                                                                                                                                                                                |                                                          | prof. dr hab. inż. Julita Dunalska      |                                     |                                                                                                                                                |            |     |
|                                             | Teachers                                                                                                                                                                                                                                          |                                                          |                                         |                                     |                                                                                                                                                |            |     |
| Lesson types                                | Lesson type                                                                                                                                                                                                                                       | Lecture                                                  | Tutorial                                | Laboratory                          | Project                                                                                                                                        | Seminar    | SUM |
|                                             | Number of study hours                                                                                                                                                                                                                             | 30.0                                                     | 0.0                                     | 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                                                       |                                         | 5.0                                 |                                                                                                                                                | 50.0       | 85  |
| Subject objectives                          | Familiarization with the basic methods of water monitoring in Poland and in the world. The course includes auditorium and field classes. Classes are carried out in a blocked form at the Center for Water Monitoring and Protection in Borucino. |                                                          |                                         |                                     |                                                                                                                                                |            |     |

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|----------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|
| Learning outcomes                                              | Course outcome                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Subject outcome                                                                                                                                                                    | Method of verification                 |
|                                                                | [GEOGRL3-U08] use scientific language and express themselves and discuss topics concerning geographic issues in Polish and in a foreign language                                                                                                                                                                                                                                                                                                                                                                                                                  | Student reads with understanding specialized scientific texts and formulates opinions on water quality in English.                                                                 | [SU5] implementation of a problem task |
|                                                                | [GEOGRL3-W08] at an advanced level methods and principles development of data on the natural and anthropogenic environment, and methods of their analysis and interpretation                                                                                                                                                                                                                                                                                                                                                                                      | Student has well-established knowledge in the field of measurement and interpretation of monitoring data. Knows the indicators of pollution of the aquatic environment.            | [SW5] implementation of a problem task |
|                                                                | [GEOGRL3-K04] social action, including cooperation to preserve the ecological balance and protect the Earth's resources and its sustainable development, using forms of own entrepreneurship for this purpose                                                                                                                                                                                                                                                                                                                                                     | It is responsible for the protection of the natural environment.                                                                                                                   | [SK5] implementation of a problem task |
|                                                                | [GEOGRL3-W07] on advanced level methods of acquiring data on the natural and anthropogenic environment, including operation of specialized equipment                                                                                                                                                                                                                                                                                                                                                                                                              | Knows the principles of environmental sampling.                                                                                                                                    | [SW5] implementation of a problem task |
|                                                                | [GEOGRL3-U06] apply methods and research tools of geographic sciences, including conducting observations and field measurements, and assess their suitability for the tasks in which the application objective of geography can be achieved                                                                                                                                                                                                                                                                                                                       | Is able to select and independently apply basic research techniques and tools, in compliance with established analytical procedures, in the field of aquatic environment research. | [SU5] implementation of a problem task |
| Subject contents                                               | Getting to know the specifics of field work and the laboratory of environmental research, the principles of creating monitoring in Poland (PMŚ) and the flow of information at the national and international level; getting acquainted with the role of volunteers in water monitoring as part of citizen science; performing measurements to assess the condition of environmental components using modern equipment and measurement devices and high frequency data; interpretation of the obtained results of monitoring tests and cause-and-effect analysis. |                                                                                                                                                                                    |                                        |
| Prerequisites and co-requisites                                | Knowledge of English                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                    |                                        |
| Assessment methods and criteria                                | Subject passing criteria                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Passing threshold                                                                                                                                                                  | Percentage of the final grade          |
|                                                                | To perform a credit work - conduct research and present the results                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 51.0%                                                                                                                                                                              | 100.0%                                 |
| Recommended reading                                            | Basic literature                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Water Framework Directive                                                                                                                                                          |                                        |
|                                                                | Supplementary literature                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Marcé R et al. 2016. Automatic High Frequency Monitoring for Improved Lake and Reservoir Management. Environmental Science&Technology, 50(20): 10780-10794                         |                                        |
|                                                                | eResources addresses                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                    |                                        |
| Example issues/<br>example questions/<br>tasks being completed |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                    |                                        |
| Work placement                                                 | Not applicable                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                    |                                        |

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