

## Subject card

|                                             |                                                                                                                                                                                                                                                                                                                 |                                                          |                                         |                                     |                                                                                                                      |            |     |
|---------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|-----------------------------------------|-------------------------------------|----------------------------------------------------------------------------------------------------------------------|------------|-----|
| Subject name and code                       | Meteorology and climatology, PG_00103628                                                                                                                                                                                                                                                                        |                                                          |                                         |                                     |                                                                                                                      |            |     |
| Field of study                              | Environmental Protection                                                                                                                                                                                                                                                                                        |                                                          |                                         |                                     |                                                                                                                      |            |     |
| Date of commencement of studies             | October 2026                                                                                                                                                                                                                                                                                                    |                                                          | 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                               | 1                                                                                                                                                                                                                                                                                                               |                                                          | Language of instruction                 |                                     | Polish                                                                                                               |            |     |
| Semester of study                           | 2                                                                                                                                                                                                                                                                                                               |                                                          | ECTS credits                            |                                     | 2.0                                                                                                                  |            |     |
| Learning profile                            | academic                                                                                                                                                                                                                                                                                                        |                                                          | Assessment form                         |                                     | exam                                                                                                                 |            |     |
| Conducting unit                             | Climate Research Laboratory -> Department of Physical Oceanography and Climate Research -> Faculty of Oceanography and Geography -> Rector                                                                                                                                                                      |                                                          |                                         |                                     |                                                                                                                      |            |     |
| Name and surname of lecturer (lecturers)    | Subject supervisor                                                                                                                                                                                                                                                                                              |                                                          | dr Mirosława Malinowska                 |                                     |                                                                                                                      |            |     |
|                                             | Teachers                                                                                                                                                                                                                                                                                                        |                                                          |                                         |                                     |                                                                                                                      |            |     |
| Lesson types                                | Lesson type                                                                                                                                                                                                                                                                                                     | Lecture                                                  | Tutorial                                | Laboratory                          | Project                                                                                                              | Seminar    | SUM |
|                                             | Number of study hours                                                                                                                                                                                                                                                                                           | 15.0                                                     | 0.0                                     | 0.0                                 | 0.0                                                                                                                  | 0.0        | 15  |
|                                             | 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                                                                                                                                                                                                                                                                                           | 15                                                       |                                         | 2.0                                 |                                                                                                                      | 33.0       | 50  |
| Subject objectives                          | Acquire basic knowledge of the atmosphere and the processes taking place in it. To recognize and interpret meteorological phenomena and processes in connection with the state of the natural environment. Identify the impact of weather conditions on the geographical environment, economy and human health. |                                                          |                                         |                                     |                                                                                                                      |            |     |

| Learning outcomes               | Course outcome                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Subject outcome                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Method of verification                                  |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|
|                                 | [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.                                                                                                                                                                                                                                                                                      | Knows and understands the basic concepts and terms of meteorology and climatology;<br><br>Describes with understanding the basic processes and phenomena, primarily physical, occurring in the atmosphere and their implications for the problem of protecting the planet's gaseous envelope;<br><br>Explains the basic physical laws governing the functioning of the atmosphere;                                                                                                                            | [SW4] test/exam - oral or written                       |
|                                 | [OŚL3_W04] Explains the meaning and indispensability of empirical data in the description and interpretation of natural phenomena and processes (occurring in the environment).                                                                                                                                                                                                                                                                                                                                                                      | When explaining processes and phenomena occurring in the atmosphere, he uses empirical data, is able to interpret them correctly                                                                                                                                                                                                                                                                                                                                                                              | [SW4] test/exam - oral or written                       |
|                                 | [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 further education;<br><br>Demonstrates responsibility for team results;<br><br>Implements the instructions of the supervisor; Is proactive and demonstrates punctuality in the implementation of individual and team activities;<br><br>Poses questions and completes tasks to deepen knowledge of atmospheric science.                                                                                                                                                              | [SK8] observation of student's independent or team work |
|                                 | [OŚL3_U08] Correctly concludes based on the available data from various sources.                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Applies basic research techniques and tools, especially statistical techniques, used in meteorology and climatology;                                                                                                                                                                                                                                                                                                                                                                                          | [SU4] test/exam - oral or written                       |
|                                 | [OŚL3_W07] Explains the causal relationship between the content of specific pollutants and the state of the environment (including human health) and the occurrence of adverse phenomena on a local, regional and global scale.                                                                                                                                                                                                                                                                                                                      | Has a basic understanding of the interrelationships between the elements of the Earth's natural environment, taking into account the role of the atmosphere in it;<br><br>Predicts potential threats to the functioning of the atmosphere and climate change resulting from the development of civilization, especially strong emissions of greenhouse gases.<br><br>Observes and describes changes in the global and regional climate and is able to provide a simple projection of their further direction. | [SW4] test/exam - oral or written                       |
| Subject contents                | <p>1. Subject of study of meteorology and climatology.2. Atmosphere (structure and properties, vertical structure, anthropogenic changes in air composition).3. Radiation of the Sun, Earth and atmosphere.4. Heat balance of the Earth's surface.5. water in the atmosphere.6. adiabatic transformations.7. Circulation of the atmosphere.8. Selected issues in climatology (climatogenic processes and factors, features of local climate, zonality and astrophenomenon of climate, features of the climate of Poland, global climate change).</p> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                         |
| Prerequisites and co-requisites | Basic knowledge about atmosphere from geography, about ideal gases physics on the level of secondary school                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                         |
| Assessment methods and criteria | Subject passing criteria                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Passing threshold                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Percentage of the final grade                           |
|                                 | written assessment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 51.0%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 90.0%                                                   |
|                                 | activity during lectures                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 51.0%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 10.0%                                                   |

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| Recommended reading                                            | Basic literature                                                                                                                                                                                     | Kozuchowski K., 1998 Atmosphere, climate, ecoclimate. PWN Scientific Publishers.Kozuchowski K. (ed), 2005, Meteorology and Climatology, PWN.Popkiewicz M., Kardaś A., Malinowski M., 2018, The science of climate, Post Factum, Sonia Draga Publishing, Unobvious Publishing.Woś A., 2000, Meteorology for geographers. PWN Scientific Publishers.                                                                                                                                       |
|                                                                | Supplementary literature                                                                                                                                                                             | Falarz M., (ed), 2021 Climate change in Poland. Past, present, future, Springer.<br><br>Kozuchowski K., 2011, Climate of Poland. A new look, PWN Lorenc H. (ed), 2005, Atlas of the climate of Poland, IMGW.Martyn D., 2000, Climates of the globe, PWN Bear T. (ed.), 2003 Dictionary of meteorology. PWN.Schoenwiese Ch-D., 1997 Climate and man. Prószyński i S-ka.Ustrnul Z., Czekierda D., 2009, Atlas of extreme meteorological phenomena and synoptic situations in Poland, IMGW. |
|                                                                | eResources addresses                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Example issues/<br>example questions/<br>tasks being completed | Explain the mechanism of the greenhouse effect<br>Discuss the components of the radiation balance of the Earth-atmosphere systems<br>Describe the model of the general circulation of the atmosphere |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Work placement                                                 | Not applicable                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |

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