

## Subject card

|                                             |                                                                                                                                                                                                                                                                                                                    |                                                          |                                         |                                     |                                                                                                                                                |            |     |
|---------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|-----------------------------------------|-------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|------------|-----|
| Subject name and code                       | Dynamical Meteorology - lecture, PG_00206218                                                                                                                                                                                                                                                                       |                                                          |                                         |                                     |                                                                                                                                                |            |     |
| Field of study                              | Oceanography                                                                                                                                                                                                                                                                                                       |                                                          |                                         |                                     |                                                                                                                                                |            |     |
| Date of commencement of studies             | October 2026                                                                                                                                                                                                                                                                                                       |                                                          | Academic year of realisation of subject |                                     | 2027/2028                                                                                                                                      |            |     |
| Education level                             | Master'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                               | 2                                                                                                                                                                                                                                                                                                                  |                                                          | Language of instruction                 |                                     | Polish                                                                                                                                         |            |     |
| Semester of study                           | 3                                                                                                                                                                                                                                                                                                                  |                                                          | ECTS credits                            |                                     | 2.0                                                                                                                                            |            |     |
| Learning profile                            | academic                                                                                                                                                                                                                                                                                                           |                                                          | Assessment form                         |                                     | exam                                                                                                                                           |            |     |
| Conducting unit                             | Laboratory of Physical Oceanography -> Department of Physical Oceanography and Climate Research -> Faculty of Oceanography and Geography -> Rector                                                                                                                                                                 |                                                          |                                         |                                     |                                                                                                                                                |            |     |
| Name and surname of lecturer (lecturers)    | Subject supervisor                                                                                                                                                                                                                                                                                                 |                                                          | prof. dr hab. Mirosław Miętus           |                                     |                                                                                                                                                |            |     |
|                                             | 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                                                       |                                         | 2.0                                 |                                                                                                                                                | 18.0       | 50  |
| Subject objectives                          | To familiarize students with the physical processes and phenomena characteristic of the atmosphere over marine areas. To familiarize students with the aspects of ocean-atmosphere interactions relevant to marine processes and the basic methods and possibilities of using meteorological data in oceanography. |                                                          |                                         |                                     |                                                                                                                                                |            |     |

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| Learning outcomes                                              | Course outcome                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Subject outcome                                                                                                                                                                                                                   | Method of verification            |
|                                                                | [OCEANMU2-W02] knows and understands complex processes and phenomena occurring in the marine environment, with particular emphasis on the coastal zone, as well as complex relationships between living and non-living elements of the aquatic environment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Knows and understands in-depth the specialist terminology used in atmospheric sciences; knows and understands in-depth the complex relationships between processes occurring in the sea and the atmosphere                        | [SW4] test/exam - oral or written |
|                                                                | [OCEANMU2-W01] knows and understands in-depth specialized terminology used in oceanography and related sciences (in Polish and a selected foreign language)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Knows and understands in-depth the specialist terminology used in atmospheric sciences; knows and understands in-depth the complex relationships between processes occurring in the sea and the atmosphere                        | [SW4] test/exam - oral or written |
|                                                                | [OCEANMU2-W04] has an in-depth understanding of the latest research trends in oceanography, as well as the possibilities for practical application of related achievements; evaluates their usefulness and limitations in solving scientific research problems, and critically analyzes and assesses their applicability                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Knows and understands in depth the basic and advanced techniques, research methods and computational tools used in contemporary atmospheric sciences, including the possibilities related to the use of numerical weather models  | [SW4] test/exam - oral or written |
|                                                                | [OCEANMU2-U02] is able to fluently and accurately use scientific terminology when presenting and discussing oceanographic issues, and to propose and justify innovative solutions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Is able to use scientific terminology fluently and appropriately in presenting and discussing problems in the field of meteorology.                                                                                               | [SU4] test/exam - oral or written |
|                                                                | [OCEANMU2-K04] is ready to critically evaluate his/her knowledge and received content in the field of natural sciences in particular in the field of the studied specialty, a in problematic situations, supports oneself with knowledge experts                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Is ready to critically evaluate the knowledge he/she has and the content he/she receives in the field of atmospheric sciences                                                                                                     | [SK4] test/exam - oral or written |
| Subject contents                                               | A.1 Introduction. Sea-atmosphere interaction. The boundary layer of the atmosphere.<br>A.2 Stability of the atmosphere over the ocean. Fog and stratus generated by dynamic processes.<br>A.3. Meteorology of the coastal zone. Specifics of ocean-atmosphere interactions in the coastal zone.<br>A.4. Meteorology and oceanography of ocean front zones.<br>A.5. Large-scale atmospheric circulation. Teleconnection patterns. Relationship of ocean circulation to atmospheric circulation.<br>A.6. Atmospheric circulation in tropical, extratropical and p[olar] region of Noth Atlantic.<br>A.7. Sea ice and its role in ocean-atmosphere interactions. Atmospheric processes over bodies of water covered by sea ice.<br>A.8. Basics of numerical weather prediction and use of atmospheric model results in oceanography. |                                                                                                                                                                                                                                   |                                   |
| Prerequisites and co-requisites                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                   |                                   |
| Assessment methods and criteria                                | Subject passing criteria                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Passing threshold                                                                                                                                                                                                                 | Percentage of the final grade     |
|                                                                | test                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 51.0%                                                                                                                                                                                                                             | 100.0%                            |
| Recommended reading                                            | Basic literature                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Herman, A., 2006, Podstawy meteorologii. Uniwersytet Gdański.<br>Holton J.R., Hakim G.J., An Introduction to Dynamics Meteorology, 5th ed. Academic Press.<br>Lindzen R.S. Dynamics in Atmospheric Physics. Cambridge Univ. Press |                                   |
|                                                                | Supplementary literature                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Satoh M., Atmospheric Circulation Dynamics and General Circulation Models. Springer and Praxis Publishing.                                                                                                                        |                                   |
|                                                                | eResources addresses                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                   |                                   |
| Example issues/<br>example questions/<br>tasks being completed | 1. Describe the general atmospheric circulation pattern.<br>2. Describe the development of a mid-latitude low pressure system.<br>3. What is ENSO and how does it work?<br>4. What is the mechanism of polar vortex evolution?<br>5. Describe the ocean-atmosphere interaction during hurricane development.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                   |                                   |
| Work placement                                                 | Not applicable                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                   |                                   |

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