University of Gdańsk

Subject card

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|---|---|---|---|
| Subject name and code | System of the natural environment (Lecture), PG_00201198 | | |
| Field of study | Physical geography and geoinformation | | |
| Date of commencement of studies | October 2026 | Academic year of realisation of subject | 2026/2027 |
| Education level | Master'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 | 1 | ECTS credits | 3.0 |
| Learning profile | academic | Assessment form | credit |
| 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 Janusz Filipiak | |
| | 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 | 4.0 | 41.0 | 75 |

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| Subject objectives | Discussion of a basic physical phenomena and processes occurring in the environment.<br>Development of the ability to use the basic laws of physics to explain the genesis of phenomena and processes observed in nature.<br>Development of the ability to use the basic laws of physics to predict the behavior of the environment and evaluate the effects of the laws of nature. |

## Learning outcomes

| Course outcome | Subject outcome | Method of verification |
|---|---|---|
| [GFGMU2_U05] is able to integrate knowledge from the discipline of Earth and environmental sciences, explaining and interpreting the interrelationships between environmental processes and phenomena in order to solve research problems in physical geography and geoinformation | Student is able to integrate knowledge of earth and environmental sciences, correctly explaining and interpreting the interrelationships between natural processes and phenomena. | [SU1] oral statement/conversation/ discussion<br>[SU4] test/exam - oral or written |
| [GFGMU2_K01] is ready to critically assess the knowledge obtained in the field of Earth and environmental sciences, particularly physical geography and geoinformation, its completion and verification through further critical analysis of scientific literature | Student is ready to critically evaluate his knowledge of the environmental system, particularly its components and interactions, supplement and verify it through critical reading of the literature on the subject. | [SK1] oral statement/conversation/ discussion<br>[SK4] test/exam - oral or written |
| [GFGMU2_W02] knows and understands to a deepened extent issues in the field of exact sciences enabling the understanding of complex processes and phenomena occurring in the Earth's natural environment, and in their interpretations consistently relay on empirical foundations, using qualitative and quantitative methods | Student knows and understands the issues of science that allow him to understand the complex processes and phenomena occurring in the natural environment of the Earth, particularly its components and interactions and in their interpretation consistently relies on empirical foundations, using qualitative and quantitative methods. | [SW4] test/exam - oral or written<br>[SW1] oral statement/ conversation/discussion |

## Subject contents

Content of the lecture:

A1. Earth as one of the planets of the solar system and the Sun as a source of radiation
A2. External and internal Radiative Forcings (RFs).
A3. The role of clouds and aerosols in the climate system.
A4. Interactions and couplings in the climate system. Teleconnections.
A5. Penetration of shortwave radiation energy into the deep ocean, thermal energy transfer, thermal stratification of seas and oceans.
A6. Thermohaline processes and the formation of water masses.
A7. Surface and deep-water circulation of ocean waters.
A8. Ocean water undulations, capillary waves and gravity waves.
A9. Wave transformation in the shallow water zone.
A10. Wind waves and ocean currents in the coastal zone.
A11. Geomorphology and geology of the planets of the solar system against the Earth.
A12. Influence of the biosphere on the other spheres of the Earth system.
A13. The role of man in the transformation of the environment from the Pleistocene to the present.
A14. Human ecological niche and the transformation of the Earth.
A15. Anthroecology theory.
A16. Theory of Systems.
A17. Hydrographical Systems.

## Prerequisites and co-requisites

## Assessment methods and criteria

| Subject passing criteria | Passing threshold | Percentage of the final grade |
|---|---|---|
| A positive score on the written test, the evaluation process according to the scale contained in the Academic Regulations | 51.0% | 100.0% |

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| Recommended reading | Basic literature | Bajkiewicz-Grabowska E., 2002, Obieg materii w systemach rzeczno-jeziornych, UW, Wydz. Geografii i Studiów Regionalnych, Warszawa.<br><br>Bertalanffy L., 1984, Ogólna teoria systemów: podstawy, rozwój, zastosowania, PWN, Warszawa.<br><br>Bulanda W., 2007, Podstawy fizyki środowiska przyrodniczego, UMCS, Lublin.<br><br>Duxbury A.C., Duxbury A.B., Sverdrup K.A., 2002, Oceany świata, PWN, Warszawa.<br><br>Fac-Beneda J., 2011, Młodoglacjalny system hydrograficzny, Wyd. UG, Gdańsk, ss. 216.<br><br>Popkiewicz M., Kardaś A., Malinowski S., 2019, Nauka o klimacie. Wydawnictwo Sonia Draga i Wydawnictwo Nieoczywiste, Warszawa. |
| | Supplementary literature | Boeker E., Grondelle van R., 2002, Fizyka środowiska. PWN, Warszawa.<br><br>Borowiak D., 2011, Właściwości optyczne wód jeziornych Pomorza, Wydaw. UG, Gdańsk.<br><br>Colling A. (red.), 2001, Ocean Circulation, Butterworth-Heinemann, Boston.<br><br>Fedorowicz S., 2010, Podstawy geofizyki i geochemii, UG, Gdańsk.<br><br>Kane J.W., 1988, Fizyka dla przyrodników. PWN, Warszawa.<br><br>Kopcewicz T., 1959, Fizyka atmosfery, PWN, Warszawa.<br><br>Miętus M., Filipiak J., 2005, Strumienie energii i masy pomiędzy morzem i atmosferą w rejonie Arktyki Norweskiej, Problemy Klimatologii Polarnej, 15: 65-81.<br><br>Peixoto J.P., Oorto A.H., 1992, Physics of climate, AIP, New York.<br><br>Pickard G.L., Emery W.J., 2003, Descriptive physical oceanography, Butterworth-Heinemann, Oxford. |
| | eResources addresses | |
| Example issues/ example questions/ tasks being completed | 1. Evolution over time of the structure of the radiative disturbance of the Earth's climate.<br>2. Milankovic cycles.<br>3. Causes and consequences of variability of thermohaline circulation. | |
| Work placement | Not applicable | |

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