

Subject card

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 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
Subject objectives	Discussion of a basic physical phenomena and processes occurring in the environment. Development of the ability to use the basic laws of physics to explain the genesis of phenomena and processes observed in nature. 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 [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 [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 rely 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 [SW1] oral statement/conversation/discussion
Subject contents	<p>Content of the lecture:</p> <p>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.</p>		
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%

Recommended reading	Basic literature	<p>Bajkiewicz-Grabowska E., 2002, Obieg materii w systemach rzeczno-jeziornych, UW, Wydz. Geografii i Studiów Regionalnych, Warszawa.</p> <p>Bertalanffy L., 1984, Ogólna teoria systemów: podstawy, rozwój, zastosowania, PWN, Warszawa.</p> <p>Bulanda W., 2007, Podstawy fizyki środowiska przyrodniczego, UMCS, Lublin.</p> <p>Duxbury A.C., Duxbury A.B., Sverdrup K.A., 2002, Oceany świata, PWN, Warszawa.</p> <p>Fac-Beneda J., 2011, Młodo-glacialny system hydrograficzny, Wyd. UG, Gdańsk, ss. 216.</p> <p>Popkiewicz M., Kardaś A., Malinowski S., 2019, Nauka o klimacie. Wydawnictwo Sonia Draga i Wydawnictwo Nieoczywiste, Warszawa.</p>
	Supplementary literature	<p>Boeker E., Grondelle van R., 2002, Fizyka środowiska. PWN, Warszawa.</p> <p>Borowiak D., 2011, Właściwości optyczne wód jeziornych Pomorza, Wydaw. UG, Gdańsk.</p> <p>Colling A. (red.), 2001, Ocean Circulation, Butterworth-Heinemann, Boston.</p> <p>Fedorowicz S., 2010, Podstawy geofizyki i geochemii, UG, Gdańsk.</p> <p>Kane J.W., 1988, Fizyka dla przyrodników. PWN, Warszawa.</p> <p>Kopcewicz T., 1959, Fizyka atmosfery, PWN, Warszawa.</p> <p>Miętus M., Filipiak J., 2005, Strumienie energii i masy pomiędzy morzem i atmosferą w rejonie Arktyki Norweskiej, Problemy Klimatologii Polarnej, 15: 65-81.</p> <p>Peixoto J.P., Oort A.H., 1992, Physics of climate, AIP, New York.</p> <p>Pickard G.L., Emery W.J., 2003, Descriptive physical oceanography, Butterworth-Heinemann, Oxford.</p>
	eResources addresses	
Example issues/ example questions/ tasks being completed	<ol style="list-style-type: none"> 1. Evolution over time of the structure of the radiative disturbance of the Earth's climate. 2. Milankovic cycles. 3. Causes and consequences of variability of thermohaline circulation. 	
Work placement	Not applicable	

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