University of Gdańsk

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_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 [SW1] oral statement/ conversation/discussion
[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 able to behave appropriately in the workplace and in everyday life by critically evaluating information received in the light of their existing knowledge, recognising the importance of knowledge in solving cognitive and practical problems, and, when faced with difficulties, drawing on expert knowledge	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

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%

Recommended reading	Basic literature	Bajkiewicz-Grabowska E., 2002, Obieg materii w systemach rzeczno-jeziornych, UW, Wydz. Geografii i Studiów Regionalnych, Warszawa. Bertalanffy L., 1984, Ogólna teoria systemów: podstawy, rozwój, zastosowania, PWN, Warszawa. Bulanda W., 2007, Podstawy fizyki środowiska przyrodniczego, UMCS, Lublin. Duxbury A.C., Duxbury A.B., Sverdrup K.A., 2002, Oceany świata, PWN, Warszawa. Fac-Beneda J., 2011, Młodoglacjalny system hydrograficzny, Wyd. UG, Gdańsk, ss. 216. 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. Borowiak D., 2011, Właściwości optyczne wód jeziornych Pomorza, Wydaw. UG, Gdańsk. Colling A. (red.), 2001, Ocean Circulation, Butterworth-Heinemann, Boston. Fedorowicz S., 2010, Podstawy geofizyki i geochemii, UG, Gdańsk. Kane J.W., 1988, Fizyka dla przyrodników. PWN, Warszawa. Kopcewicz T., 1959, Fizyka atmosfery, PWN, Warszawa. Miętus M., Filipiak J., 2005, Strumienie energii i masy pomiędzy morzem i atmosferą w rejonie Arktyki Norweskiej, Problemy Klimatologii Polarnej, 15: 65-81. Peixoto J.P., Oorto A.H., 1992, Physics of climate, AIP, New York. 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. 2. Milankovic cycles. 3. Causes and consequences of variability of thermohaline circulation.	
Work placement	Not applicable	

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