University of Gdańsk

Subject card

Subject name and code	Synoptic climatology, PG_00135499						
Field of study	Physical geography and geoinformation						
Date of commencement of studies	October 2024		Academic year of realisation of subject		2024/2025		
Education level	postgraduate studies		Subject group		Obligatory subject group 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				
Conducting unit	Pracownia Badań Klimatu -> Katedra Oceanografii Fizycznej i Badań Klimatu -> Faculty of Oceanography and Geography						
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	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		15.0		30.0	60
Subject objectives	Familiarization with the physical basis of atmospheric processes, particularly at the synoptic scale. Familiarizationwith the methods of synoptic analysis. Identification of the role of regional atmospheric circulation in shaping local climatic and oceanographic conditions.						

Learning outcomes

Course outcome	Subject outcome	Method of verification
[GFGMU2_K01] critical assessment of knowledge in the field of Earth and environmental sciences and geoinformation, its completion and verification through critical analysis of scientific literature	Student is ready to critically evaluate his knowledge of the temporal and spatial relationships of atmospheric processes and phenomena, to supplement it and to verify his knowledge and skills through critical reading of the literature on the subject.	[SK1] oral statement/conversation/ discussion [SK4] test/exam - oral or written
[GFGMU2_U02] precisely and appropriately use terminology in the field of physical geography and geoinformation in oral statements and written works	Student is able to proficiently and appropriately apply the terminology of synoptic climatology in oral statements and written works.	[SU1] oral statement/conversation/ discussion [SU4] test/exam - oral or written
[GFGMU2_W02] 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 in the field of atmospheric dynamics with particular emphasis on geophysics allowing to understand the complex processes and phenomena occurring in the Earth's atmosphere, their essence, genesis and possible consequences, manifested, among other things, by the influence of atmospheric circulation on the variability of climatic and oceanographic conditions.	[SW4] test/exam - oral or written [SW1] oral statement/ conversation/discussion
[GFGMU2_U04] describe and analyze the causes and course of physical and geographical processes and phenomena, selecting and applying advanced techniques and research tools in the field of statistical and geoinformation methods, interpreting the results, using theoretical knowledge to formulate own opinions and conclusions	Student is able to describe and analyze the causes and course of atmospheric processes and phenomena, skillfully selecting and applying research techniques and tools from the field of statistical methods, interpreting the results obtained as a consequence, and then using theoretical knowledge to formulate their own opinions and conclusions.	[SU1] oral statement/conversation/ discussion [SU4] test/exam - oral or written

Subject contents

1. Theoretical basis of synoptic climatology: functions in multiple dimensions, gradient.

2. Physical description of particle motion: advection, particle trajectories, scale analysis, hydrostatic and geostrophic equilibrium, thermal wind.

3. Fundamentals of dry and moist thermodynamics: thermodynamic diagram, stability, fundamentals of convective cloud physics.

4. Elements of synoptic meteorology: synoptic analysis, air masses, atmospheric fronts, baric systems.

5. Dynamics of the atmosphere.

6. Development of extratropical cyclones.

7. Classification systems of atmospheric circulation forms.

8. Case studies.

Prerequisites and co-requisites

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Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
obtaining a passing grade on the written test	51.0%	100.0%

Recommended reading

Basic literature

Holton, J., 2004, An introduction to dynamic meteorology, Elsevier, Amsterdam.

Yarnal B., 1994, Synoptic climatology in environmental analysis. A primer. Wiley, 256pp.

Yarnal, Brent et al., 2001, Development and Prospects in Synoptic Climatology. International Journal of Climatology 21: 19231950.

Zwieriew, A., 1965, Meteorologia synoptyczna, WKiŁ, Warszawa.

	Supplementary literature	Barry R.G., Carelton A.M., 2001, Synoptic and Dynamic Climatology, Routledge. Bluestein, H., 1992-1993, Synoptic-dynamic meteorology In midlatitudes. Vol. I, II, Cambridge University Press, Cambridge. Marosz M., Wójcik R.,Pilarski M., Miętus M., 2013, Extreme daily precipitation totals in Poland during summer: the role of regional atmospheric circulation, Climate Research, Vol. 56: 245259, 2013, doi: 10.3354/cr01155. Miętus M., Filipiak J., Wojtkiewicz A., Malik P., Jakusik E., 2008, Warunki termiczne na obszarze Polski w świetle modelu statystyczno-empirycznego [w:] M. Miętus (red.) Statystyczno-empiryczny model warunków termicznych w Polsce, Monografie, Instytut Meteorologii i Gospodarki Wodnej, s. 9-65. Pettersen, S., 1956, Weather analysis and forecasting.Vol. I, II., McGraw-Hill, New York. WMO, 1975. Compendium of meteorology: Vol. I, Part I: Dynamic Meteorology, WMO No. 364, Genewa. WMO, 1978. Compendium of meteorology: Vol. I, Part III: Synoptic Meteorology, WMO No. 364, Genewa.
	eResources addresses	Adresy na platformie eNauczanie:
Example issues/ example questions/ tasks being completed	Various approaches to the development of extratropical cyclone model - Norwegian school and Shapiro - Keyser: philosophy of approach, theoretical and practical differences	
Work placement	Not applicable	

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