GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	, PG_00069054		
Field of study	Geodesy and Cartography		
Date of commencement of studies	February 2025	Academic year of realisation of subject	2025/2026
Education level	second-cycle studies	Subject group	
Mode of study	Full-time studies	Mode of delivery	at the university
Year of study	1	Language of instruction	Polish Polish
Semester of study	2	ECTS credits	3.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Department of Geodesy -> Faculty of Civil and Environmental Engineering -> Wydziały Politechniki Gdańskiej		
Name and surname of lecturer (lecturers)	Subject supervisor	prof. dr hab. inż. Mariusz Figurski	
	Teachers		

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	15.0	0.0	30.0	0.0	0.0	45

E-learning hours included: 0.0

eNauczanie source addresses:

Moodle ID: 1448 Geodezja w badaniach zmian klimatu
https://enauczanie.pg.edu.pl/2025/course/view.php?id=1448

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	45	0.0	0.0	45

Subject objectives

The course aims to expand students' understanding of climate systems and processes to enable effective use of geodetic and cartographic tools to interpret information related to climate change. The curriculum includes analyzing factors influencing climate patterns and variability, as well as recognizing signals of climate change using geographic, geodetic, remote sensing, and satellite data. The acquired knowledge will enable them to correctly interpret media messages and make fact-based decisions. Furthermore, participants will be prepared to objectively assess issues related to climate change and its impact on the environment and society.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_U06] creates solutions to complex and unstructured problems taking into account the variability of the environment by synthesising information from different sources, using analytical and simulation methods	They can create solutions to complex and unstructured problems that take into account the variability of the Earth's ecosystem by synthesizing information from various sources. They can apply analytical methods (geodetic, statistical data processing, trend analysis) and simulation (numerical deformation modeling) to assess the impact of climate change on infrastructure and landscapes. They are skilled at integrating GNSS measurement results, photogrammetric techniques, and laser scanning to develop comprehensive spatial models.	[SU4] Assessment of ability to use methods and tools [SU2] Assessment of ability to analyse information
[K7_W05] has a well-established knowledge of analytical methods and surveying techniques necessary for creating and solving a variety of problems in geodesy and cartography	Students will have a basic understanding of the causes and effects of contemporary climate change and the major challenges facing civilization today. They will be able to utilize analytical geodetic and cartographic methods to study climate change and establish cause-and-effect relationships within the Earth's ecosystem.	[SW1] Assessment of factual knowledge [SW3] Assessment of knowledge contained in written work and projects

Subject contents

What is climate and how does it relate to geodesy?
How do we conduct climate observations?
Energy powers everything!
The role of water in climate
General circulation patterns in the climate system
Modes of natural variability in the climate system
Climate change over the past 4 billion years
Anthropogenic climate change and the use of geodetic analytics
Climate change observations and the use of modern geodesy measurement tools.
Climate models and projections and geographic, geodetic, and cartographic data
Climate impacts, inequalities, and climate justice
Coping with climate change and climate solutions using geodetic methods.

Prerequisites and co-requisites

Knowledge of the subject of Geodesy, remote sensing, physics, mathematics

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Exercises - test	60.0%	40.0%
semester paper	60.0%	60.0%

Recommended reading

Basic literature	Tamulewicz J., 1997. Pogoda i klimat Ziemi. Wydawnictwo Kurpisz, Poznań. Popkiewicz M., Kardaś A., Malinowski S., 2018. Nauka o klimacie. Wydawnictwo Nieoczywiste, Warszawa. Bostrom N., Cirkovic N.M., 2011, Global catastrophic risks, Oxford University Press, USA. Smil V., 2008, Global catastrophes and trends: The next 50 years, The MIT Press. Turchin A., Denkenberger D., 2020, Classification of global catastrophic risks connected with artificial intelligence. AI & Soc 35, 147163.
Supplementary literature	Woś A, 2006. Meteorologia dla geografów. Wydawnictwo Naukowe UAM. Poznań. Kożuchowski K. (red.), 2006. Meteorologia i klimatologia. Wydawnictwo Naukowe PWN, Warszawa.
eResources addresses	

Example issues/ example questions/ tasks being completed	Does climate-resilient infrastructure focus solely on protecting existing systems, rather than modernizing them or incorporating renewable energy sources? Why are in-situ measurements particularly important for studying near-surface temperature, and how have technological advances improved data collection over the past century? If I wanted to observe trends in sea ice extent at the North and South Poles (i.e., how much of the surface is covered by ice), would a polar or geostationary satellite be a better choice?
Work placement	Not applicable

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