University of Gdańsk

Subject card

Subject name and code	Data visualization, PG_00135505						
Field of study	Physical geography and geoinformation						
Date of commencement of studies	October 2024		Academic year of realisation of subject		2025/2026		
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	2		Language of instruction		Polish		
Semester of study	3		ECTS credits		2.0		
Learning profile	academic		Assessment form				
Conducting unit	Pracownia Systemów Informacji Geograficznej - GIS -> Faculty of Oceanography and Geography						
Name and surname of lecturer (lecturers)	Subject supervisor		mgr Zbigniew Trusewicz				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	0.0	0.0	30.0	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		15.0		15.0	60
Subject objectives	1. Acquiring knowledge on effective presentation/communication of research results. 2. Improving practical skills in using Information Technology tools to present research results						

Learning outcomes

Course outcome	Subject outcome	Method of verification
[GFGMU2_K03] accepting responsibility for group work assuming various roles in it, participating in preparation of scientific projects, taking responsibility for the equipment and safety rules, active developing of professional competences and knowledge in Earth and environmental sciences and geoinformation, including interdisciplinarity, as well as developing the principles of professional ethics, respecting copyright rules	The student is ready to take responsibility for group work by assuming various roles within it, participating in the preparation of scientific projects, actively expanding professional competencies and updating knowledge in the field of geoinformation, as well as adhering to and developing professional ethics, including respecting copyright in their own and others' work. Contents: 1-9.	[SK2] presentation/project/paper/ report [SK8] observation of student's independent or team work
[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	The student is ready to critically assess his/her knowledge of Geographic Information Systems, to supplement and verify it by critically engaging with the relevant literature. Contents: 1-9.	[SK2] presentation/project/paper/ report
[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	The student is able to describe and analyze physical geographical processes and phenomena by skillfully selecting and applying advanced research techniques and tools in the field of geoinformatics methods, interpreting the results obtained from these methods, and then using theoretical knowledge to formulate their own opinions and conclusions. Contents: 1-9.	[SU2] presentation/project/paper/ report
[GFGMU2_U03] effectively use selected scientific literature in the field of physical geography and geoinformation, both in Polish and English	The student is able to effectively utilize appropriately selected scientific literature in the fields of physical geography and geoinformation in both Polish and English. Contents: 1-9.	[SU2] presentation/project/paper/ report
[GFGMU2_W05] principles of planning field and laboratory research using techniques and research tools used in geomorphology, hydrology and climatology, as well as principles of operating equipment and devices used to obtain and process digital geographic information in accordance with health and safety principles	The student knows and understands the principles of operating equipment and devices used for acquiring and processing digital geographic information. Contents: 1-9.	[SW2] presentation/project/paper/ report
[GFGMU2_W04] theoretical foundations of research methods used in physical geography and closely related sciences, descriptive and mathematical statistics, as well as advanced methods of analyzing spatial phenomena	The student knows and understands the theoretical foundations of research methods used in physical geography and closely related sciences, as well as advanced methods for analyzing spatial phenomena. Contents: 1-9.	[SW2] presentation/project/paper/ report
[GFGMU2_U02] precisely and appropriately use terminology in the field of physical geography and geoinformation in oral statements and written works	The student is able to proficiently and appropriately use terminology from the field of geoinformation in written work. Contents: 1-9.	[SU2] presentation/project/paper/ report

Subject contents

1. Goals, methods, tools, and applications of data visualization in physical geography.
2. Preparing data for visualization using the R package (dplyr package).
3. Pipeline processing (magrittr package).
4. R base package - data presentation methods.
5. R ggplot2 package - introduction, variable mapping, content management, chart creation techniques.
6. Preparing publication-quality charts.
7. Spatio-temporal clustering analyses.
8. 4D visualization of socio-economic and environmental phenomena.
9. Visualization of lithological data using vector graphics.

Prerequisites and co-requisites

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
practical exercises	51.0%	100.0%

Recommended reading	Basic literature	- J. Sander, M. Ester, H.-P. Kriegel, and X. Xu. Density-based clustering in spatial databases: The algorithm gdbscan and its applications. Data Min. Knowl. Discov., 2(2):169194, 1998. - M. Ester, H.-P. Kriegel, J. Sander, and X. Xu. A density-based algorithm for discovering clusters in large spatial databases with noise. In KDD, 1996. - Biecek P., 2017, Przewodnik po pakiecie R, Oficyna wydawnicza GIS, Warszawa. - Wickham H., 2017, ggplot2: Elegant- Graphics for Data Analysis , Springer International Publishing. - Dykes J., MacEachren A.M., Kraak M-J., 2005, Exploring Geovisualization. - Kraak M-J., 1998, Kartografia: wizualizacja danych przestrzennych.
	Supplementary literature	- Bajkiewicz-Grabowska E., Markowski M., Lemańczyk K., 2016, Application of geoinformation techniques to determine zones of sediment resuspension induced by wind waves in lakes (using two lakes from Northern Poland as examples) , Limnological Review, 16: 3-14. - Houlding S., 2012, 3D geoscience modeling: computer techniques for geological characterization. Springer.Natali M., Klausen T.G., Patel D., 2014, Sketch-based modelling and visualization of geological deposition. Computers & Geosciences, 67: 40-48.
	eResources addresses	Adresy na platformie eNauczanie:
Example issues/ example questions/ tasks being completed	Processing data using R to prepare it for graphical visualization. Creating a geological profile using vector graphics. Using Space Time Cubes in ArcGIS Pro for spatiotemporal analysis.	
Work placement	Not applicable	

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