GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	GEOINFORMATICS OF URBANISED AREAS, PG_00044856		
Field of study	Geodesy and Cartography		
Date of commencement of studies	October 2023	Academic year of realisation of subject	2025/2026
Education level	first-cycle studies	Subject group	Optional subject group 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	3	Language of instruction	Polish
Semester of study	5	ECTS credits	6.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Department of Geodesy -> Faculty of Civil and Environmental Engineering		
Name and surname of lecturer (lecturers)	Subject supervisor		
	Teachers		

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	30.0	15.0	15.0	0.0	0.0	60

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	60	8.0	82.0	150

Subject objectives

The student learns the basics of Spatial Information Systems - GIS. They learn how to handle vector data in GIS software. He or she performs data control on the basis of topological relations. The student gets acquainted with network analyses, basics of graph theory and the way the Dijksta algorithm works. During the course the student will learn how to create their own network in ArcGIS environment and will perform analyses based on the created network.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_W10] has elementary knowledge and understands the concepts of architecture and urban planning, construction, environmental engineering and transport necessary to carry out studies related to planning and investment service	The student knows the methods uses of measurement geodetic in communication.	
[K6_U05] is able to develop a simple algorithm and prepare a simple program in object-oriented language taking into account the geodetic specifics and the specificity of spatial information systems	Can perform spatial data analysis on vector and raster data.	

Subject contents

Geoinformatics - introduction, basic concepts, tasks. Spatial data models. Spatial databases. Design of GIS systems. Metadata. Spatial analysis of GIS. Network analyses. Networks as graphs. Optimal path algorithms. Flow modelling. Ant colony algorithm. Quality of geoinformatics data. Geoinformation uncertainty

Prerequisites and co-requisites

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Report	80.0%	30.0%
Colloquium	60.0%	70.0%

<table>
<tr><td rowspan="3">Recommended reading</td><td>Basic literature</td><td>- Stateczny A. (ed.), Comparative navigation methods. Gdańsk Scientific Society, Gdansk, 2004.
- Stateczny A., Praczyk T., Artificial neural networks in recognition of marine objects. GTN, Gdansk, 2002.
- Stateczny A., Comparative Navigation. GTN Gdańsk, 2001.
- Bielecka E., Geographic information systems. Theory and applications. PJWSTK Publishing House, Warsaw 2006.
- Burrough P., McDonnell A., Principles of Geographical Information Systems. Oxford University Press, New York 2004.
- Davis D., GIS for everyone. MICON Publishing House, Warsaw 2004.
- Eckes K., Models and analysis in spatial information systems.Wydawnictwa AGH University of Science and Technology, Cracow 2006.
- El-Sheimy N., Valeo C., Habib A., Digital Terrain Modelling. Acquisition, manipulation, and applikations. Artech House, Boston 2005.
- Gaździcki J., Geomatical Lexicon. Polish Society The Institute for Spatial Information, Warsaw 2003.
- Kraak M., Ormeling F., Cartography, data visualisation spatial, PWN, 1998.
- Kwiecień J., Geographic Information Systems. Basics. ATR Publishing House in Bydgoszcz, Bydgoszcz 2004.
- Li Z., Zhu Q., Gold Ch., Digital Terrain Modeling. Principles and methodology. CRC PRESS, Boca Raton 2005.
- Litwin L., Myrda G., Geographic Information Systems.Spatial data management in GIS, SIP, SIT, LIS. HELION Publishing House, 2005.
- Longley P., Goodchil M., Maguire D., Hind. D., GIS theory and practice. PWN Warszawa 2006.
- Magnuszewski A., GIS in physical geography. PWN, 1999.</td></tr>
<tr><td>Supplementary literature</td><td>• Geoinformation software manuals
• Articles in scientific journals such as Remote Sensing,Sensors, Journal of Geo-Information, Journal of Geodesy,Geoinformatics, IEEE Transactions on Geoscience and Remote Sensing,</td></tr>
<tr><td>eResources addresses</td><td>Adresy na platformie eNauczanie:</td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td colspan="2">1. Geoinformatics, geoinformation, SIP, SIT
2. Stages of GIS construction and features of a good GIS system
3. Spatial analyses - definition, stages of implementation process, division.
4. Spatial analyses relevant from the geoinformatics point of view
5. Classic network analysis problems.
6. Determining the shortest path in the raster model.
7. Angle sum algorithm and parity algorithm.
8. Determining the position of a point relative to a polygon
9. Three-dimensional analysis
10. Networks as graphics.
11. Optimal path algorithms (A*, Dijkstra, Bellman-Ford).
12. Flow modelling.
13. Formal algorithm.
14. Sources of geographical data errors.
15. Causes and types of errors.
16. Spatial data emats.
17. Simple and topological vector model.
18. Continuous objects
19. Discuss the stages of geobase design.
20. Discuss the design stages of GIS systems.
21. Division of spatial analysis and spatial modelling types.
22. Metadata - definition, purpose, functions.
23. Standardization of metadata.
24. Search, recognition and application metadata.
25. Data quality components.
26. Data quality parameters.
27. Data quality elements of spatial data.
28. Data quality characteristics of good quality data.
29. Model of internal data quality problems and data availability problems.
30. Data quality testing in geoinformation systems.</td></tr>
<tr><td>Work placement</td><td colspan="2">Not applicable</td></tr>
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