GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	GEOINFORMATICS OF URBANISED AREAS, PG_00044849		
Field of study	Geodesy and Cartography		
Date of commencement of studies	October 2022	Academic year of realisation of subject	2024/2025
Education level	first-cycle studies	Subject group	Optional subject group
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	9.0	81.0	150

Subject objectives

The student learns the basics of Spatial Information Systems - GIS. Then he or she broadens the knowledge about data acquisition, collection, processing and modelling. He or she gets acquainted with 3D visualization in GIS, analysis and processing of ALS data. In the final stage of the course the student performs the analysis of visibility and shading in ArcGIS environment.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[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 data analysis spatial data vector and raster	
[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 urbanized areas.	

Subject contents

Geoinformatics - introduction, concepts, tasks. Aqusition of spatial data. DTM - definition, tasks, applications. DTM - introduction to numerical modelling methods. Neural modelling methods. Generalization - reduction of measurement data. 3D GIS. Surface analyses. Visibility analyses. Analysis of surface changes.

Prerequisites and co-requisites

Assessment methods and criteria

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

Recommended reading	Basic literature	- Stateczny A. (ed.), Comparative navigation methods. Gdańsk Scientific Society, Gdańsk, 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 analyses in spatial information systems.Wydawnictwa AGH, Cracow 2006. - El-Sheimy N., Valeo C., Habib A., Digital Terrain Modelling.Acquisition, manipulation, and application. Artech House, Boston 2005. - Gaździcki J., Geomatical Lexicon. Polish Society of Spatial Information, Warsaw 2003. - Kraak M., Ormeling F., Cartography, spatial data visualisation, PWN, 1998. - KwiecieńJ., Geographic Information Systems.Podstawy.Wydawnictwo ATR 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.Management of spatial data in GIS, SIP, SIT, LIS. HELION Publishing House, 2005. - Longley P., Goodchil M., Maguire D., Hind. D., GIS theory and practice. PWN Warsaw 2006. - Magnuszewski A., GIS in physical geography. PWN, 1999.
	Supplementary literature	- 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,
	eResources addresses	Adresy na platformie eNauczanie:

Example issues/ example questions/ tasks being completed	1. Draw Thiessen's training ground on 20 sample points. 2. Determine the values at the point (x,y,?) using the inverse distance method with a smoothing parameter of 1 for the following measurement points: (x1,y1,z1), (x2,y2,z2), (x3,y3,z3), (x4,y4,z4), (x5,y5,z5), (x6,y6,z6) and the method parameter equal to 2. 3. Determine the values at the point (x,y,?) by triangulation with linear interpolation. Coordinates of vertices of the triangle: (x1,y1,z1), (x2,y2,z2), (x3,y3,z3) 4. Natural neighbor's method. 5. Geostatic method. 6 DTM - definition, tasks, applications. 7. DTM grid type selection and division of modelling methods. 8. TIN creation methods. 9. Interpolation of surfaces using TIN. 10. Medium weight methods. 11. Minimal curvature method. 12. Methods based on radial functions. 13. Triangle method in measurement data reduction. 14. Douglas-Pucker method. 15. Triangle reduction methods. 15. 16. Methods of reducing the grid of squares. 16. 17. Artificial neural networks in the construction of DTM - design and preparation of a learning set. 18. GRNN network in the construction of DTM. 19. 3D GIS - levels of detail and stages of creating 3D maps. 20 The process of creating an orthophotomap. 21. 3D photorealistic model. 22. Sampling of field measurement data. 23. Aerial photograph-photomap-orthotomap. 24. Satellite photos and aerial photos. 25. LIDAR data acquisition. 26. Use of analog materials in the process of geodata acquisition. 27. Surface analysis. 28. Visibility analysis. 29. Analysis of surface changes. 30. Geoinformatics, geoinformation, SIP, SIT
Work placement	Not applicable