



## Subject card

Subject name and code	GEOINFORMATICS OF URBANISED AREAS, PG_00044849						
Field of study	Geodesy and Cartography						
Date of commencement of studies	October 2025		Academic year of realisation of subject		2027/2028		
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 -> Wydziały Politechniki Gdańskie]						
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_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.				
	[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				
Subject contents	Geoinformatics - introduction, concepts, tasks. Aquisition 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		
	Raport		80.0%		30.0%		
	Colloquium		60.0%		70.0%		

Recommended reading	Basic literature	<ul style="list-style-type: none"> <li>- Stateczny A. (ed.), Comparative navigation methods. Gdańsk Scientific Society, Gdańsk, 2004.</li> <li>- Stateczny A., Praczyk T., Artificial neural networks in recognition of marine objects. GTN, Gdansk, 2002.</li> <li>- Stateczny A., Comparative Navigation. GTN Gdańsk, 2001.</li> <li>- Bielecka E., Geographic information systems. Theory and applications. PJWSTK Publishing House, Warsaw 2006.</li> <li>- Burrough P., McDonnell A., Principles of Geographical Information Systems. Oxford University Press, New York 2004.</li> <li>- Davis D., GIS for everyone. MICON Publishing House, Warsaw 2004.</li> <li>- Eckes K., Models and analyses in spatial information systems. Wydawnictwa AGH, Cracow 2006.</li> <li>- El-Sheimy N., Valeo C., Habib A., Digital Terrain Modelling. Acquisition, manipulation, and application. Artech House, Boston 2005.</li> <li>- Gaździcki J., Geomatical Lexicon. Polish Society of Spatial Information, Warsaw 2003.</li> <li>- Kraak M., Ormeling F., Cartography, spatial data visualisation, PWN, 1998.</li> <li>- Kwiecień J., Geographic Information Systems. Podstawy. Wydawnictwo ATR in Bydgoszcz, Bydgoszcz 2004.</li> <li>- Li Z., Zhu Q., Gold Ch., Digital Terrain Modeling. Principles and methodology. CRC PRESS, Boca Raton 2005.</li> <li>- Litwin L., Myrda G., Geographic Information Systems. Management of spatial data in GIS, SIP, SIT, LIS. HELION Publishing House, 2005.</li> <li>- Longley P., Goodchild M., Maguire D., Hind. D., GIS theory and practice. PWN Warsaw 2006.</li> <li>- Magnuszewski A., GIS in physical geography. PWN, 1999.</li> </ul>
	Supplementary literature	<ul style="list-style-type: none"> <li>- Geoinformation software manuals</li> <li>- Articles in scientific journals such as Remote Sensing, Sensors, Journal of Geo-Information, Journal of Geodesy, Geoinformatics, IEEE Transactions on Geoscience and Remote Sensing,</li> </ul>
	eResources addresses	Adresy na platformie eNauczanie:

Example issues/ example questions/ tasks being completed	<ol style="list-style-type: none"> <li>1. Draw Thiessen's training ground on 20 sample points.</li> <li>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.</li> <li>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)</li> <li>4. Natural neighbor's method.</li> <li>5. Geostatic method.</li> <li>6 DTM - definition, tasks, applications.</li> <li>7. DTM grid type selection and division of modelling methods.</li> <li>8. TIN creation methods.</li> <li>9. Interpolation of surfaces using TIN.</li> <li>10. Medium weight methods.</li> <li>11. Minimal curvature method.</li> <li>12. Methods based on radial functions.</li> <li>13. Triangle method in measurement data reduction.</li> <li>14. Douglas-Pucker method.</li> <li>15. Triangle reduction methods. 15.</li> <li>16. Methods of reducing the grid of squares. 16.</li> <li>17. Artificial neural networks in the construction of DTM - design and preparation of a learning set.</li> <li>18. GRNN network in the construction of DTM.</li> <li>19. 3D GIS - levels of detail and stages of creating 3D maps.</li> <li>20 The process of creating an orthophotomap.</li> <li>21. 3D photorealistic model.</li> <li>22. Sampling of field measurement data.</li> <li>23. Aerial photograph-photomap-orthotomap.</li> <li>24. Satellite photos and aerial photos.</li> <li>25. LIDAR data acquisition.</li> <li>26. Use of analog materials in the process of geodata acquisition.</li> <li>27. Surface analysis.</li> <li>28. Visibility analysis.</li> <li>29. Analysis of surface changes.</li> <li>30. Geoinformatics, geoinformation, SIP, SIT</li> </ol>
Work placement	Not applicable

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