GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Geographic Information System - GIS I, PG_00068136		
Field of study	Spatial Development		
Date of commencement of studies	October 2026	Academic year of realisation of subject	2027/2028
Education level	first-cycle studies	Subject group	Obligatory subject group in the field of study 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	2	Language of instruction	Polish
Semester of study	3	ECTS credits	3.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Department of Urban Design and Regional Planning -> Faculty of Architecture -> Faculties of Gdańsk University of Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. arch. Weronika Mazurkiewicz	
	Teachers		

Lesson types

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

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	5.0	25.0	75

Subject objectives

The course consists of a series of lectures in the form of tutorials available on a YouTube channel, laboratory sessions, and project work focused on the use of GIS tools and spatial analysis methods in the context of selected areas of Gdańsk. The curriculum covers topics such as statistical analyses (choropleth and diagram maps), geoprocessing in QGIS and ArcGIS (using both vector and raster data), network analysis and route modeling, as well as space syntax methods using depthmapX. Subsequent modules address geocoding, multi-criteria analysis, 3D animations in ArcGIS Pro, and the use of ArcGIS Online applications such as dashboards and story maps. Techniques for raster data classification and process modeling with tools like Model Builder are also discussed.

During the laboratory sessions, students prepare detailed spatial analyses of selected areas of Gdańsk. The work involves selecting appropriate methods and tools, applying them, and presenting the final results in the form of a project delivered to representatives of municipal institutions. The labs also include an introduction to creating websites as platforms for presenting analytical outcomes.

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K6_U07] evaluates the usefulness of standard methods and tools used in planning and management of spatial development and is able to select and apply the most appropriate ones	The student is able to critically assess the usefulness of standard methods and tools used in spatial planning and development management. Within the course, the student learns to select and apply the most appropriate analytical and cartographic techniques, adjusting them to the scale and specificity of a given spatial problem. The student demonstrates the ability to justify methodological choices and effectively integrate various tools (e.g. QGIS, ArcGIS Pro, depthmapX, ArcGIS Online) in the process of developing complex spatial analyses and presenting planning proposals.	[SU4] Assessment of ability to use methods and tools [SU3] Assessment of ability to use knowledge gained from the subject [SU2] Assessment of ability to analyse information
	[K6_U03] acquires, collects and classifies information in the field of spatial management from a variety of sources, including literature, databases, electronic sources, field observations, surveys and interviews; can perform urban and ruralistic inventory	The student is able to independently acquire, collect, and process spatial data from various sources, including databases, digital maps, online resources, field observations, as well as information obtained through qualitative methods (surveys and interviews). During project work, the student can apply appropriate GIS tools for the classification and visualization of spatial data, performing statistical, spatial, network, and multi-criteria analyses.	[SU5] Assessment of ability to present the results of task [SU4] Assessment of ability to use methods and tools [SU3] Assessment of ability to use knowledge gained from the subject [SU2] Assessment of ability to analyse information [SU1] Assessment of task fulfilment

Subject contents	Course content – lecture Block 1: Statistical Analyses in GIS **Lectures 1 and 2:** Introduction to statistical analysis tools in GIS, with a special focus on choropleth maps and cartodiagrams as methods for visualizing spatial data. Practical use of QGIS software to create these analyses. **Laboratory 1 (1.5h):** Division of students into analytical pairs. Introduction to the subject matter and basics of website creation as a platform for presenting analysis results. **Laboratory 2 (1.5h):** Practical execution of statistical analyses in groups, improving teamwork skills and applying the learned tools. Block 2: Geoprocessing Vectors and Rasters **Lectures 3 and 4:** Discussion of geoprocessing techniques used in QGIS and ArcGIS, including work with vector and raster data. Overview of basic tools for spatial data processing. **Laboratory 3 (1.5h):** Group work on tasks using the learned methods, techniques, and analyses. **Laboratory 4 (1.5h):** Group work on tasks using the learned methods, techniques, and analyses. Block 3: Network Analyses and Route Modeling **Lectures 5 and 6:** Introduction to network analyses and route modeling over terrain using QGIS and ArcGIS. Familiarization with the space syntax method and the DepthmapX tool for spatial structure analysis. **Laboratory 5 (1.5h):** Group work on tasks using the learned methods, techniques, and analyses. **Laboratory 6 (1.5h):** Group work on tasks using the learned methods, techniques, and analyses. Block 4: Geocoding and Multi-Criteria Analyses **Lectures 7 and 8:** Presentation of address geocoding techniques and multi-criteria analysis methods in GIS. Discussion of ways to integrate different data layers and decision criteria. **Laboratory 7 (1.5h):** Group work on tasks using the learned methods, techniques, and analyses. **Laboratory 8 (1.5h):** Group work on tasks using the learned methods, techniques, and analyses. Block 5: 3D Analyses and Animations **Lectures 9 and 10:** Introduction to three-dimensional spatial analysis and animation creation using ArcGIS Pro. Discussion of the potential of 3D visualization for spatial planning purposes. **Laboratory 9 (1.5h):** Group work on tasks using the learned methods, techniques, and analyses.

Laboratory 10 (1.5h):
Group work on tasks using the learned methods, techniques, and analyses.

Block 6: Working with ArcGIS Online Applications

Lectures 11 and 12:
Introduction to various types of applications available in ArcGIS Online, including dashboards and story maps as tools for interactive spatial data presentation.

Laboratory 11 (1.5h):
Group work on tasks using the learned methods, techniques, and analyses.

Laboratory 12 (1.5h):
Group work on tasks using the learned methods, techniques, and analyses.

Block 7: Raster Classification

Lectures 13 and 14:
Overview of raster data classification techniques in ArcGIS Pro. Analysis of different classification methods and their practical applications.

Laboratory 13 (1.5h):
Group work on tasks using the learned methods, techniques, and analyses.

Laboratory 14 (1.5h):
Group work on tasks using the learned methods, techniques, and analyses.

Block 8: Process Automation Model Builder

Lecture 15:
Introduction to Model Builder and graphical modeller as tools for automating and visualizing analytical processes in GIS.

Laboratory 15:
Presentation of projects and websites.

Prerequisites and co-requisites

Course completion: PG_00068064_INFORMATION_TECHNIQUES_GIS I INVENTORY

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Project presentation	51.0%	60.0%
Completion of all tutorials	51.0%	40.0%

Recommended reading

Basic literature	1. Bielecka E., Systemy informacji geograficznej. Teoria i zastosowania, Wyd. PJWSTK, Warszawa 2006 2.Ciołkosz A., Miszalski J., Olędzki J.R., Interpretacja zdjęć lotniczych, Wyd. Naukowe PWN, Warszawa 1999 3. Gotlib D., Iwaniak A., Olszewski R., GIS. Obszary zastosowań, PWN, Warszawa 2008 4. Januszewski J., Systemy satelitarne GPS, Galileo i inne, PWN, Warszawa 2006 5. Kraak-Menno J., Ormeling F., Kartografia-wizualizacja danych przestrzennych, PWN, Warszawa 1998 6. Kurczyński Z., Preuss R., Podstawy fotogrametrii, Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 2004 7. Kwietniewski M., GIS w wodociągach i kanalizacji, PWN, Warszawa 2008 8. Longley P.A., Goodchild M.F., Rhind D.W., Magnuszewski A. (red.), GIS Teoria i praktyka, PWN, Warszawa 2006
Supplementary literature	9. Magnuszewski A., GIS w geografii fizycznej, PWN, Warszawa 1999 10. Pasławski J. (red.), Wprowadzenie do kartografii i topografii, Wyd. Nowa Era, 2006 11. Suchecki B., Ekonometria przestrzenna. Metody i modele analizy danych przestrzennych, Wyd. C.H, Beck, 2010 12. Urbański J., GIS w badaniach przyrodniczych, Wyd. Uniw. Gdańskiego, Gdańsk 2008 13. van Nes, A., Yamu, C., Introduction to Space Syntax in Urban Studies, Springer, 2021.

	eResources addresses	
Example issues/ example questions/ tasks being completed	**Sample Topics:** • Methods of spatial data visualization: choropleth maps and cartodiagrams. • Processing vector and raster data in QGIS and ArcGIS. • Network analyses and route modeling applications in spatial planning. • Principles of geocoding and their role in GIS analyses. • Methods of multi-criteria analysis and spatial decision-making. • Creating 3D visualizations and animations in ArcGIS Pro. • Using ArcGIS Online applications: dashboards, story maps. • Raster data classification techniques and practical applications. • Automation of GIS processes using Model Builder. **Sample Questions:** • What are the differences between a choropleth map and a cartodiagram? In what situations is each most appropriate? • What tools in QGIS and ArcGIS are used for raster geoprocessing? • How can network analysis support urban transport planning? • What are the basic steps in the process of address geocoding? • What criteria can be included in multi-criteria analysis of urban space? • How can 3D animations facilitate planning communication with residents? • What are the applications of dashboards and story maps in spatial data presentation? • Which raster classification methods are most commonly used in urban planning practice? • What benefits does automation of GIS processes with Model Builder bring?	
Practical activites within the subject	Not applicable	

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