University of Gdańsk

Subject card

Subject name and code	Quantitative methods in spatial planning – exercises, PG_00191736						
Field of study	Spatial Management						
Date of commencement of studies	October 2026		Academic year of realisation of subject		2027/2028		
Education level	Bachelor's 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		6.0		
Learning profile	academic		Assessment form		credit		
Conducting unit							
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. Tomasz Michalski				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	0.0	15.0	60.0	0.0	0.0	75
	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	75		0.0		75.0	150
Subject objectives	The aim of the course is to provide knowledge about a set of measurement tools and analyses performed in the context of issues related to analysis, planning, and spatial development, including statistical tools and computer applications (GIS) for visual analysis and spatial planning, to acquire the skills to use these tools, and to acquire the competence to independently decide on the choice of tools appropriate for a given problem.						

Learning outcomes

Course outcome	Subject outcome	Method of verification
[GPL3_U08] performs complex research tasks or demonstrates expertise in the field of spatial management under the guidance of a scientific supervisor, alone and in a team, and presents the results of the research in a written and oral form in Polish and in a foreign language	uses a specialised CAD software interface uses this skill in discussions with specialists in the field of planning and spatial development	[SU3] text preparation/written work [SU4] test/exam - oral or written
[GPL3_U06] uses specialist language in a debate with specialists in the field of spatial planning and management	uses analytical methods and computer simulations in solving engineering tasks in the field of spatial management taking into account systemic links	[SU3] text preparation/written work [SU4] test/exam - oral or written
[GPL3_U04] makes the correct selection of basic quantitative methods (including field research), uses them in the analysis of spatial diversity of natural, social or economic phenomena and also makes a correct interpretation of the results on the basis of the specificity of selected methods	uses quantitative methods in the presentation and analysis of socio-economic and environmental phenomena in space	[SU2] presentation/project/paper/report [SU3] text preparation/written work [SU4] test/exam - oral or written
[GPL3_U03] selects appropriate sources of information and, on this basis, gives opinions on the development of space for a specific area with particular regard to the principles of sustainable development and spatial order	lists, describes and is able to read maps used in spatial planning, and is able to read and execute a planning drawing using the basic capabilities of CAD and ArcGIS Pro software	[SU2] presentation/project/paper/report [SU6] demonstration of practical skills
[GPL3_K06] is ready to care for the achievements and traditions of the profession, and comply with the principles of professional ethics by themselves and to demand that from others	recognition of the principles of graphic presentation adopted in cartography, geography and spatial analysis	[SK3] text preparation/written work [SK4] test/exam - oral or written
[GPL3_W08] knows and understands the principles of operating basic equipment, devices and software used to obtain and process geographical information and spatial planning	has a basic understanding of the functions and use of selected CAD software, understands the principles of operating basic equipment and devices used to obtain and process geographical information	[SW4] test/exam - oral or written [SW3] text preparation/written work
[GPL3_K03] is ready to identify and resolve cognitive problems related to the profession in accordance with the latest knowledge in the field of spatial management, including expert opinions	the use of quantitative methods to analyse and solve cognitive problems in spatial economics	[SK2] presentation/project/paper/report [SK4] test/exam - oral or written

Subject contents

Use of basic statistical procedures in analysis using a spreadsheet.
Use of selected statistical methods in analysis using specialized computer software.
Learning about forms of visualization of phenomena and processes on maps using specialized computer software (GIS)

Prerequisites and co-requisites

Knowledge of basic mathematical operations. Ability to read and understand formulas. Proficient computer skills.

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
tests and assignments in selected quantitative methods (laboratory groups)	51.0%	25.0%
Work in the field of visualization using GIS (laboratory groups)	51.0%	25.0%
tests on basic statistics (lecture groups)	51.0%	25.0%
tests on basic statistical measures (laboratory groups)	51.0%	25.0%

Recommended reading	Basic literature	• Adamowicz M., Janulewicz P., 2012, Wykorzystanie metod wielowymiarowych w określeniu pozycji konkurencyjnej gminy na przykładzie województwa lubelskiego, Metody Ilościowe w Badaniach Ekonomicznych, nr 1 • Augustyniak H., 1999, Statystyka opisowa z elementami demografii, Przedsiębiorstwo Wydawnicze Ars boni et aequi, Poznań. • Hartigan J.A., Wong M.A., 1979, A K-Means Clustering Algorithm, Applied Statistics, 28, 100. • Iwaniak A., Olszewski R., Gotlib D., 2008, GIS. Obszary zastosowań, Wydawnictwo Naukowe PWN, Warszawa. • Makać W., Urbanek-Krzysztofiak D., 2003, Metody opisu statystycznego, Wydawnictwo Uniwersytetu Gdańskiego, Gdańsk.
	Supplementary literature	• Runge J., 2007, Metody badań w geografii społeczno-ekonomicznej elementy metodologii, wybrane narzędzia badawcze, Wyd. UŚ., Katowice • Iwańczak B., 2010, Wizualizacja komputerowa w geografii, czyli poradnik z recepturami krok po kroku, Uniwersytet Warszawski, Warszawa.
	eResources addresses	Basic https://www.statsoft.pl/textbook/stathome_stat.html? - Cluster analysis (Electronic Statistics Texbook) https://www.dts.put.poznan.pl/wp-content/uploads/QGIS/20210518_318_QGIS.pdf - Szczepanek R., Zmuda-Trzebiatowski P., 2021, Samouczek - wstęp do QGIS (QGIS 3.18 Zürich) https://gis-support.pl/swietny-podrecznik-akademicki-do-qgis-za-darmo/ - Szczepanek R., 2017, Systemy informacji przestrzennej z QGIS: podręcznik akademicki. Cz. 1 i 2. Wydawnictwo Politechniki Krakowskiej, Kraków. https://www.statystyka.eu/analiza-skupien/metoda-k-srednich.php - k-means method https://mfiles.pl/pl/index.php/Metoda_Warda - Ward's method (Management Encyclopedia) http://stat.gov.pl/statystykaregionalna/publikacje-regionalne/podreczniki-atlasy/podreczniki/mapy-statystyczne-opracowanie-i-prezentacja-danych,1,1.html - Pieniążek M., Zych M., 2017, Mapy statystyczne. Opracowanie i prezentacja danych, GUS, Warszawa Supplementary https://www.researchgate.net/publication/377149971_Systemy_informacji_geograficznej_w_praktyce_studium_z - Kunz M. (ed.), 2007. Systemy Informacji Geograficznej w praktyce. Studium zastosowań. Wydawnictwo Uniwersytetu Mikołaja Kopernika, Toruń. https://geoforum.pl/action/?action=download&id=54 - Urbański J., 2012. GIS w badaniach przyrodniczych
Example issues/ example questions/ tasks being completed	• Zone statistics for raster layers • Classification of administrative units using multidimensional methods (hierarchical analysis, agglomeration analysis, k-means method) • Estimating building heights based on NMT and NMPT • Analysis of visibility in built-up areas • Remote sensing analysis using the NDVI index as an example • Presenting results on maps in the form of cartograms. • Calculating measures of a single variable	
Work placement	Not applicable	

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