GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Models in spatial development, PG_00065312		
Field of study	Spatial Development		
Date of commencement of studies	February 2026	Academic year of realisation of subject	2026/2027
Education level	second-cycle studies	Subject group	Obligatory subject group in the field of study
Mode of study	Full-time studies	Mode of delivery	at the university
Year of study	1	Language of instruction	Polish
Semester of study	2	ECTS credits	2.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Department of Urban Design and Regional Planning -> Faculty of Architecture -> Wydziały Politechniki Gdańskiej		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Robert Skrzypczyński	
	Teachers		

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	30.0	0.0	0.0	0.0	0.0	30

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	30	4.0	16.0	50

Subject objectives

To acquaint students with various types of models used in spatial management, methods of their creation and application.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_U02] analyzes and critically evaluates the existing spatial phenomena and solutions occurring in urbanized structures of different scales (in the district, city, region); indicates solutions to problem situations and determines the appropriate directions of spatial development, taking into account multiple conditions; prepares up elements of planning studies on spatial policy and development strategies of the city and the region	Student indicates the place and method of applying models in the process of planning cities and regions	[SU2] Assessment of ability to analyse information
[K7_U04] plans and carries out computer simulations; uses information and communication technologies in an advanced way; interprets the obtained results and draws conclusions on phenomena related to spatial development	Student can choose a quantitative model based on digitized tools, which is appropriate to the task related to spatial planning and identified spatial conditions	[SU4] Assessment of ability to use methods and tools [SU1] Assessment of task fulfilment

Subject contents	1. The concept and types of models and their role. 2. Iconographic and descriptive (ideological, conceptual) models concerning cities historical and contemporary. 3. Models in urban, region and country planning - creation and application. 4. Models of tourism development. 5. Systemic views of cities and other social territorial systems. 6. Population models. 7. Partial and comprehensive quantitative models (mathematical and simulation models of cities): model classifications, Lowry model, models: gravity, flow, Land-Use Transportation Interactions (LUTI), cellular automata, Agent-Based Models, microsimulation models. The paradigm of Zipser spatial decisions, ORION. Predictive models based on machine learning tools and neural networks. 8. Data sources applicable for quantitative models. 9. Models of regional growth. 10. Spatial processes, selected theories of spatial management - model approaches. 11. City control models. 12. Application of models in scenarios. 13. Applicability of quantitative models in the planning practice - the example of "smart city" and "resilient city" 14. Classical theories of urban analysis in quantitative big data based-models.
Prerequisites and co-requisites	

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Activity during lectures - tests (quizzes)	50.0%	20.0%
Colloquium (test)	50.0%	80.0%

Recommended reading	Basic literature	1. Carta, S., Big Data, Code and the Discrete City Shaping Public Realms, Routledge, 2020 2. Domański R., Gospodarka przestrzenna. Podstawy teoretyczne (rozdz. 9), WN PWN, Warszawa 2006. 3. Kitchin R., Lauriault, T.P., McArdle, G., Data and the City, Routledge, 2018 4. Malisz B., Teoria kształtowania układów osadniczych, Arkady, Warszawa 1981. 5. Mironowicz I., Modele transformacji miast, Oficyna Wyd. Politechniki Wrocławskiej, Wrocław 2016. 6. Offenhuber, D., C., Decoding the City: Urbanism in the Age of Big Data, MIT, 2014 7. Prezentacje do wykładów (pliki pdf). 8. Shi, W., Goodchild, M., Batty, M., Kwan, M.-P., Zhang, A. (red.), Urban Informatics, Springer, 2021 9. Suchecki B., Ekonometria przestrzenna. Metody i modele analizy danych przestrzennych, Wyd. C.H, Beck, 2010 10. van Nes, A., Yamu, C., Introduction to Space Syntax in Urban Studies, Springer, 2021.
	Supplementary literature	1. Majda T., Mironowicz I. (ed.), Manifesty urbanistyczne, Biblioteka Urbanisty 15, Warszawa 2017. 2. Zipser T, Sławski J. Modele procesów urbanizacji, Studia KPZK PAN XCVII, PWE, Warszawa 1988.
	eResources addresses	
Example issues/ example questions/ tasks being completed	1. Types of models from the point of view of: the way of expressing reality / the goals of their construction 2. In which phases of the planning process the models can be used? 3. What can models refer to in designing the spatial structure of the city? 4. What submodels does the LUTI Model contain? 5. What data can supply quantitative models? 6. How big data can enhance the process of shaping cities? 7. How the "space syntax" methodology can be applicable in the planning practice? 8. List examples of the use of machine learning and neural networks as a tools helping to understand urbanization processes.	
Work placement	Not applicable	