GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Technical infrastructure planning - urban engineering , PG_00068162		
Field of study	Spatial Development		
Date of commencement of studies	October 2025	Academic year of realisation of subject	2026/2027
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	4	ECTS credits	4.0
Learning profile	general academic profile	Assessment form	exam
Conducting unit	Department of Advanced Urbanism -> Faculty of Architecture -> Faculties of Gdańsk University of Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. arch. Piotr Smolnicki	
	Teachers		

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	30.0	30.0	0.0	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	8.0	32.0	100

Subject objectives

The aim of the course Technical Infrastructure Planning Urban Engineering is to develop the ability to analyse, design, and coordinate urban technical infrastructure systems. Students learn the principles governing transport, water and wastewater, energy, gas, telecommunications, and drainage networks, as well as their interrelations with spatial planning. The course builds competencies in assessing infrastructure needs, formulating technical solutions, integrating diverse systems, and critically evaluating planning documents, preparing students to shape sustainable urban environments.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_W02] has knowledge in the fields of science and scientific disciplines, relevant to spatial management, including history and theory of architecture, construction and related engineering industries	The student possesses structured knowledge of the functioning and development of urban technical infrastructure systems and their relationships with spatial planning. They understand the theoretical and historical foundations of transport, water and wastewater, energy, gas, telecommunications, and drainage infrastructure, and recognize their role within the broader context of architecture, construction, and urban engineering.	[SW2] Assessment of knowledge contained in presentation [SW3] Assessment of knowledge contained in written work and projects
[K6_U01] has the ability to abstractly understand technical problems; applies basic mathematical and simulation methods in urban planning and spatial planning	The student is able to analyse and interpret complex technical problems related to the functioning of urban infrastructure systems. They apply basic computational, analytical, and simulation methods to assess the demand, capacity, and performance of transport, water and wastewater, energy, gas, telecommunications, and drainage infrastructure, using these tools within urban design and spatial planning processes.	[SU5] Assessment of ability to present the results of task

Subject contents	Course content – lecture The course introduces urban technical infrastructure systems and their relationship with spatial planning. It covers the functioning and design principles of transport, water supply, wastewater, energy, gas, telecommunications, and drainage networks. Lectures address fundamentals of traffic engineering, media demand calculations, network coordination, and resolving infrastructure conflicts. The course also discusses legal regulations, planning documents, technical standards, and principles of sustainable and climateresilient infrastructure planning. Course content – exercises Exercises develop practical skills in analysing, calculating, and designing elements of urban technical infrastructure. Students complete tasks related to transport, water supply, wastewater systems, energy, gas, and telecommunications, as well as network coordination. As part of the semester project, they prepare an integrated infrastructure concept for a selected area, applying basic computational and simulation methods.
Prerequisites and co-requisites	
Assessment methods and criteria	

Subject passing criteria	Passing threshold	Percentage of the final grade
Assignment completion review	100.0%	100.0%

Recommended reading	Basic literature	1. Spatial Planning • Act on Spatial Planning and Development • Act on Real Estate Management • Construction Law • Geodetic and Cartographic Law 2. Transport Infrastructure • Act on Public Roads • Road Traffic Law • Regulation on the technical conditions that public roads and their location must meet • Regulation on traffic management on roads 3. Water Supply and Sewerage • Act on Collective Water Supply and Collective Wastewater Disposal • Water Law • Regulation on the technical conditions for water supply and sewerage networks 4. Energy and District Heating • Energy Law • Act on Renewable Energy Sources • Technical regulations concerning power networks (e.g., regulation on the technical conditions for power networks) 5. Gas Infrastructure • Energy Law (gas section) • Regulation on the technical conditions for gas networks 6. Telecommunications • Telecommunications Law • Act on Supporting the Development of Telecommunications Services and Networks 7. Environment and Safety • Environmental Protection Law • Act on Environmental Impact Assessments • Act on Preventing Major Industrial Accidents 8. Spatial Data • Act on Spatial Information Infrastructure

	Supplementary literature	Council, N. R., Studies, D. on E. and L., & Resources, B. on E. S. and. (2013). *Underground Engineering for Sustainable Urban Development* (1st ed.). National Academies Press. https://doi.org/10.17226/14670 Silva, H., Oliveira, J. R. M., Dong, Z., & Williams, R. C. (2024). *Sustainability of Transport Infrastructures*. MDPI - Multidisciplinary Digital Publishing Institute. https://doi.org/10.3390/books978-3-7258-2901-9 Grigg, N. S. (2012). *Water, wastewater, and stormwater infrastructure management* (2nd ed.). IWA Pub. https://doi.org/10.1201/b12237 Żur, K., Barretta, R., Agarwal, R., & Ruta, G. (2023). *Encyclopedia of Engineering*. MDPI - Multidisciplinary Digital Publishing Institute. https://doi.org/10.3390/books978-3-0365-7001-3
	eResources addresses	
Example issues/ example questions/ tasks being completed	Example topics for discussion • The role of technical infrastructure in urban development and spatial shaping. • Interdependencies between infrastructure systems (transport, water, energy, telecommunications). • Technical standards and minimum required distances between utility networks. • Infrastructure conflicts typical cases and methods of resolving them. • Stormwater retention and bluegreen infrastructure. • The impact of infrastructure on the costs of urbanization and suburbanization. • Infrastructure resilience to climate change. • The role of local spatial development plans (MPZP) and administrative decisions in shaping infrastructure.	
Practical activites within the subject	Not applicable	

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