GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Seminar on modern traffic modeling methods and road technologies, PG_00059875		
Field of study	Civil Engineering		
Date of commencement of studies	February 2025	Academic year of realisation of subject	2025/2026
Education level	second-cycle studies	Subject group	Optional subject group
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	3.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Department of Transportation Engineering -> Faculty of Civil and Environmental Engineering		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Jacek Oskarbski	
	Teachers		

Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	0.0	0.0	0.0	0.0	30.0	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	5.0	40.0	75

Subject objectives	To familiarise Students with transport issues using methods of graph theory, queue theory, computer simulations. To familiarise Students with modern methods of road technology.

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K7_U08] Is able to evaluate technical conditio of a road, to design its pavement and choose proper construction technology using mechanistic methods and material investigations	The selection of modern road technology tools.	[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
	[K7_W06] has expanded knowledge about traffic theory, planing of road networks and junctions design, regarding economy, safety and environmental aspects	Analysis of the use of graph theory for modelling transport networks. An analysis of the application of traffic task allocation models and traffic distribution models to the transport network.	[SW2] Assessment of knowledge contained in presentation [SW1] Assessment of factual knowledge
	[K7_W07] has expanded knowledge of theory of road and airport pavements, pavement maintenence, advanced methods of material testing and contruction technologies	Analysis of modern road technology tools.	[SW2] Assessment of knowledge contained in presentation [SW1] Assessment of factual knowledge
	[K7_U07] is able to design elements of road network, to apply the rules of traffic organisation and control, taking into account economy, safety and environmental factors,	The choice of tools for analysing and evaluating the transport system depends on the type of model used.	[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	Transport system models. Distribution of flows in transport networks. Transport system environment. Forecasting the development of transport systems. Dynamics of transport processes. Definitions: transport network, transport process. Graph representation of the transport network. Transport process models model elements, structure, traffic streams. Modelling and dependencies in vehicle traffic flows. Basic characteristics of distributions of random variables used in the description of the traffic process. Macroscopic, mesoscopic and microscopic traffic models Trip generation models. Spatial distribution models. Trip distribution models. Models of traffic distribution in a transport network. Macroscopic, meso and microscopic traffic modelling software packages. Modern technologies in road engineering. Use of modern road technologies in the design and construction of road surfaces.
Prerequisites and co-requisites	

Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Development of the report and presentation of the issue	100.0%	100.0%

Recommended reading	Basic literature	1. Gniadenko B. W., Kowalenko I. N.: Wstęp do teorii obsługimasowej.PWN, Warszawa 1971.2. Koźniewska I., Włodarczyk M.:Modele odnowy, niezawodności imasowej obsługi. PWN, Warszawa1978.3. Leszczyński J. Modelowanie systemów i procesówtransportowych,Oficyna wydawnicza Politechniki Warszawskiej,1999.4.Sienkiewicz P.: Inżynieria systemów. MON, Warszawa 1983.5.Smalko Z.: Modelowanie eksploatacyjnych systemówtransportowych.ITE, Radom 1996.6. Woropay M., Knopik L., Landowski B.:Modelowanie procesóweksploatacji w systemie transportowym.Biblioteka ProblemówEksploatacji. ITE, Bydgoszcz-Radom 2001.
	Supplementary literature	Scientific articles on traffic modelling and modern road technologies.
	eResources addresses	Adresy na platformie eNauczanie:

Example issues/ example questions/ tasks being completed	Modelling traffic flows. Modelling of movement in networks. Graphical representation of transport system and process. Graphical representation of the transport network. Stream distribution models of transport network traffic costs, traffic congestion, minimum cost stream distribution and equilibrium distribution. Traffic flow simulation. Simulation models. Modern road technology methods.
Work placement	Not applicable

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