



## Subject card

Subject name and code	Basics of Teletraffic Engineering, PG_00048120						
Field of study	Electronics and Telecommunications						
Date of commencement of studies	October 2021	Academic year of realisation of subject			2023/2024		
Education level	first-cycle studies	Subject group			Optional subject group 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	3	Language of instruction			Polish		
Semester of study	5	ECTS credits			2.0		
Learning profile	general academic profile	Assessment form			assessment		
Conducting unit	Department of Teleinformation Networks -> Faculty of Electronics, Telecommunications and Informatics						
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Sylwester Kaczmarek					
	Teachers	dr hab. inż. Sylwester Kaczmarek dr inż. Marcin Narloch					
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	15.0	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	2.0		18.0		50
Subject objectives	Obtain knowledge and skills to use IRT to design telecommunications network resources with a guarantee of service quality.						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	[K6_U31] can identify telecommunications network architectures, differentiates their areas and functional elements, evaluates the quality of service delivery, calculates parameters of functional elements	Student has skills of practical designing and dimensioning of services systems of the switching node and trunks for the service of the traffic generated both subscribers and node control.			[SU1] Assessment of task fulfilment		
	[K6_W35] Knows the concepts of the technique of signal transmission, operation of telecommunications networks and multimedia services and the rules for providing them	Student describes basic models to quantitative analysis and synthesis of resources of the telecommunication networks.			[SW1] Assessment of factual knowledge		

Subject contents	<p>LECTURE: The essence and the need for the existence of traffic engineering (IR). General IR model. IR function model. Modelling complexity and its decomposition. Network, node and link level. Service system - the basic element of IR. Description of request and service event streams. Statistical equilibrium equation. Poisson, Erlang, Engset and Bernoulli models of the service system. Load capacity of service devices. End-to-end Grade of Service. Waiting service systems. Service classes - priority service systems. A model for calculating the time of message (packet) transfer in the network. Protocol stack and link performance. End-to-end Quality of Service (losses, delay and its variability). Network service classes. ITU-T reference model. Response time of the node control system. BHCA calculation method. Analytical model for the signalling system protocol stack. Dimensioning gateway resources between networks. ITU-T recommended traffic measurement and determination methods.</p> <p>PRACTICE: Calculation of request stream parameters. Calculation of service stream parameters. Solving the equation of the state of statistical equilibrium. Calculation of resources of traffic concentrator. Calculation of resources for internode connections. Determining the network traffic flow matrix. Calculation of resources on the connection path for a given GoS. Dimensioning the resources of the waiting service system for various conditions. Analysis and synthesis service system with service classes. Calculation of end-to-end transfer time for messages (packets). Calculation of link performance for selected user plane and signalling protocol stacks. Calculation end-to-end packet loss probability. Calculation of average and maximum end-to-end delay times. Calculation of node control response time. Calculation of BHCA nodes in the network. Designing the number of signalling links. Conversion of channel-switched traffic into packet-switched streams. Calculation of media gateway resources between networks. Calculation of the hour and intensity of the highest traffic.</p>											
Prerequisites and co-requisites	No requirements											
Assessment methods and criteria	<table border="1" data-bbox="448 748 1497 853"> <thead> <tr> <th data-bbox="448 748 799 786">Subject passing criteria</th> <th data-bbox="804 748 1139 786">Passing threshold</th> <th data-bbox="1144 748 1497 786">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="448 792 799 822">Analytical task</td> <td data-bbox="804 792 1139 822">50.0%</td> <td data-bbox="1144 792 1497 822">50.0%</td> </tr> <tr> <td data-bbox="448 828 799 853">Midterm test</td> <td data-bbox="804 828 1139 853">50.0%</td> <td data-bbox="1144 828 1497 853">50.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	Analytical task	50.0%	50.0%	Midterm test	50.0%	50.0%
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Analytical task	50.0%	50.0%										
Midterm test	50.0%	50.0%										
Recommended reading	Basic literature	Materials prepared by the lecturer available in electronic form in PDF files and in the form of a photocopy (on request).										
	Supplementary literature	No requirements										
	eResources addresses	Adresy na platformie eNauczenie: Podstawy inżynierii ruchu telekomunikacyjnego - 2023 - Moodle ID: 31566 <a href="https://enauczenie.pg.edu.pl/moodle/course/view.php?id=31566">https://enauczenie.pg.edu.pl/moodle/course/view.php?id=31566</a>										
Example issues/ example questions/ tasks being completed												
Work placement	Not applicable											