GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	QoS Packet-Optical Networks Design, PG_00064024		
Field of study	Electronics and Telecommunications		
Date of commencement of studies	February 2027	Academic year of realisation of subject	2026/2027
Education level	second-cycle studies	Subject group	Optional subject group Specialty 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	1	Language of instruction	Polish
Semester of study	1	ECTS credits	2.0
Learning profile	general academic profile	Assessment form	exam
Conducting unit	Department of Teleinformation Networks -> Faculty of Electronics Telecommunications and Informatics -> Faculties of Gdańsk University of Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Sylwester Kaczmarek	
	Teachers	dr hab. inż. Sylwester Kaczmarek	

Lesson types

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

getting to know methods of designing next generations networks using different technologies and architecture in individual layers for this one networks

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_W10] knows and understands, to an increased extent, the basic processes occurring in the life cycle of equipment, objects and technical systems, as well as methods of supporting processes and functions, specific to the field of study	The student applies analytical models of service systems and calculates quality parameters, describes advanced service systems for complex packet streams with differentiation of service classes.	[SW1] Assessment of factual knowledge
[K7_W03] knows and understands, to an increased extent, the construction and operating principles of components and systems related to the field of study, including theories, methods and complex relationships between them and selected specific issues - appropriate for the curriculum	The student is using different methods applied in practice of the network design guaranteeing the diversity qualities of services.	[SW1] Assessment of factual knowledge

<table>
<tr><td>Subject contents</td><td>Course content – lecture
Aims and tasks of design the NGN and NGI networks. Parameters describing GoS and QoS packet networks for IP QoS, MPLS, OTN and DWDM technologies. Elements of teletraffic engineering are needed for design. Models of traffic source and streams. Markov streams and description of their irregularities. MMPP stream and its varieties. MMDP model. ON-OFF stream. Self-similarity and its measure; short- and long-range dependent streams. Guaranteed different class of service (streaming, elastic). Service system models for edge (access). Service system models in domens (core). Models with priorities. Models of service systems with self-similar streams. Effective bandwide and calculation methods. Statistical multiplexing REM and RS model. e2e delay budget and its variation in design according to ITU-T. Application of large deviation theory. Traffic control mechanisms and its design. CAC, DBAC and MBAC function. Traffic flow in network and describing source destination path. Z model in network design. Formal description of design. Traffic allocation design. Optimisation of path selection. Dijkstra and Bellman-Ford algorithm. Linear programming methods for solving task design. Integer programming method for solving task design. Evolution algorithms for solving task design. One layer design for IP QoS, MPLS, OTN and DWDM technology. Multilayer design for IP QoS, MPLS, OTN and DWDM technology. Traffic grooming. Designing fault-tolerant networks. Designing networks resistant to changes in the traffic matrix. Designing the interface between the ISDN/GSM network and the IP QoS network.</td></tr>
<tr><td>Prerequisites and co-requisites</td><td>No requirements</td></tr>
<tr><td>Assessment methods and criteria</td><td><table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>Written exam</td><td>50.0%</td><td>100.0%</td></tr>
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<tr><td>Recommended reading</td><td><table>
<tr><td>Basic literature</td><td>Materials prepared by the lecturer available in electronic form in PDF files and in the form of a photocopy (on request).</td></tr>
<tr><td>Supplementary literature</td><td>No requirements</td></tr>
<tr><td>eResources addresses</td><td></td></tr>
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<tr><td>Example issues/ example questions/ tasks being completed</td><td></td></tr>
<tr><td>Practical activites within the subject</td><td>Not applicable</td></tr>
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