GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Information Transport Systems, PG_00048337		
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	assessment
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 inż. Magdalena Młynarczuk	
	Teachers	dr inż. Magdalena Młynarczuk	

Lesson types							
	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	15.0	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	Learnng of the structure, operation principles and standardization of optical networks, which are used for the transport of information. Practical knowledge of configuration and protection for WDM devices.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[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	Student knows methods of transport and concentration of data in optical systems, construction and standardization of the optical transport network, functions of the transport layer and control planes in ASON and GMPLS networks, techniques of resource discovery and routing.	[SW1] Assessment of factual knowledge
[K7_U12] is able, to an increased extent, to analyze the operation of components and systems related to the field of study, as well as to measure their parameters and study their technical characteristics, and to plan and carry out experiments related to the field of study, including computer simulations, interpret the obtained results and draw conclusions	Student is able to analyze the configuration and protection in WDM devices, functioning of the transport plane and control plane in ASON and GMPLS networks, as well as resource discovery and routing techniques	[SU2] Assessment of ability to analyse information [SU4] Assessment of ability to use methods and tools [SU5] Assessment of ability to present the results of task
[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	Student knows and understands control plane functions and the principles of configuration of optical WDM nodes, data concentration on the edge of the transport network, methods of configuration and protection of transport services in OTN.	[SW1] Assessment of factual knowledge
[K7_U09] can carry out a critical analysis of the functioning of existing technical solutions and assess these solutions, as well as apply experience related to the maintenance of advanced technical systems, devices and facilities typical for the field of studies, gained in the professional engineering environment	The student is able to critically analyze the functioning of optical networks used for information transport. The student is able to apply the acquired experience in configuring and maintaining optical networks.	[SU3] Assessment of ability to use knowledge gained from the subject [SU2] Assessment of ability to analyse information

Subject contents

Course content – lecture

LECTURE:

1. Working principles of the optical transport network (OTN).
2. Cooperation of SDH systems with OTN optical network.
3. Ethernet standard in the optical transport network.
4. Standardization of OTN network interfaces recommendation G.709.
5. Functions of optical channels OCh, optical multiplexing sections OMS, optical transport sections OTS.
6. Connection points, network elements and tributary signals in the OTN optical layer.
7. Clocks synchronization in the optical transport network.
8. GMPLS (Generalized Multiprotocol Label Switching) network - Generalized Multiprotocol Label Switching.
9. Architecture, functionality and elements of Automatically Switched Optical Network (ASON).
10. Reliability of information transport in the optical network.
11. Comparison of protection techniques in optical transport networks.
12. Elements of DWDM line transmission system.
13. Principles of telecommunications fibre-optics parameters selection for DWDM systems in OTN.
14. Elastic Optical Networks.
15. Long distance optical transmission systems (transoceanic and continental) specificity of solutions.
16. METRO networks specifics requirements and optical layer realization.

LABORATORY:

1. Configuration of WDM optical nodes in the GMPLS network.
2. Establishing LSP services in the DWDM layer.
3. Methods for protecting LSP services.
4. Implementation of routing functions in the ASON/GMPLS architecture.
5. Resource discovery procedures in the ASON/GMPLS architecture.
6. Multimedia service distribution in GEPON network.

Prerequisites and co-requisites

<table>
<tr><td>Assessment methods and criteria</td><td colspan="2"><table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>Midterm colloquium</td><td>50.0%</td><td>60.0%</td></tr>
<tr><td>Practical exercise</td><td>50.0%</td><td>40.0%</td></tr>
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<tr><td rowspan="3">Recommended reading</td><td>Basic literature</td><td>Material prepared by the lecturer available in electronic form.

Manuals available in electronic form.</td></tr>
<tr><td>Supplementary literature</td><td>Kula S.: Teletransmission systems (in Polish); WKŁ Warsaw 2004

Simmons J. M.: Optical Network Design and Planning, Springer, 2014

ITU-T: Rec. G.7703/Y.1304, Architecture for the automatically switched optical network. 05/2021

ITU-T: Rec. G.709/Y.1331, Interfaces for the Optical Transport Network (OTN), 06/2020

Mannie E., Generalized Multi-Protocol Label Switching (GMPLS) Architecture, IETF, RFC 3945, 10/2004</td></tr>
<tr><td>eResources addresses</td><td></td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td colspan="2"></td></tr>
<tr><td>Practical activites within the subject</td><td colspan="2">Not applicable</td></tr>
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