



Subject card

Subject name and code	Information Transport Systems, PG_00048337						
Field of study	Electronics and Telecommunications						
Date of commencement of studies	February 2024	Academic year of realisation of subject			2023/2024		
Education level	second-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	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						
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Magdalena Młynarczuk					
	Teachers	dr inż. Magdalena Młynarczuk					
Lesson types and methods of instruction	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	Learning 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_U06] can analyse the operation of components, circuits and systems related to the field of study; measure their parameters; examine technical specifications; interpret obtained results and draw conclusions	Student is able to analyze the configuration and security in WDM devices, functioning of the transport layer and control in ASON, resource discovery and routing techniques			[SU1] Assessment of task fulfilment [SU2] Assessment of ability to analyse information [SU4] Assessment of ability to use methods and tools		
	[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	Student can make a critical analysis of the functioning of optical networks, used to transport of information.			[SU2] Assessment of ability to analyse information [SU3] Assessment of ability to use knowledge gained from the subject		
	[K7_W05] Knows and understands, to an increased extent, methods of process and function support, specific to the field of study.	Student knows and understands the principles of configuration of 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_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 and control layers in ASON, techniques of resource discovery and routing.			[SW1] Assessment of factual knowledge			

Subject contents	<ol style="list-style-type: none"> 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. 											
Prerequisites and co-requisites												
Assessment methods and criteria	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 40%;">Subject passing criteria</th> <th style="width: 30%;">Passing threshold</th> <th style="width: 30%;">Percentage of the final grade</th> </tr> </thead> <tbody> <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> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	Midterm colloquium	50.0%	60.0%	Practical exercise	50.0%	40.0%
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Midterm colloquium	50.0%	60.0%										
Practical exercise	50.0%	40.0%										
Recommended reading	Basic literature	<p>Kula S.: Systemy teletransmisyjne; WKL Warszawa 2004</p> <p>Material prepared by the lecturer available in electronic form.</p> <p>Manuals available in electronic form.</p>										
	Supplementary literature	<p>Simmons J. M.: Optical Network Design and Planning, Springer, 2014</p> <p>ITU-T: Rec. G.7703/Y.1304, Architecture for the automatically switched optical network. 05/2021</p> <p>ITU-T: Rec. G.709/Y.1331, Interfaces for the Optical Transport Network (OTN), 06/2020</p> <p>Mannie E., Generalized Multi-Protocol Label Switching (GMPLS) Architecture, IETF, RFC 3945, 10/2004</p>										
	eResources addresses	<p>Adresy na platformie eNauczenie:</p> <p>Systemy transportu informacji - wykład - 2024 - Moodle ID: 28752 https://enauczenie.pg.edu.pl/moodle/course/view.php?id=28752</p> <p>Systemy transportu informacji - wykład - 2024 - Moodle ID: 28752 https://enauczenie.pg.edu.pl/moodle/course/view.php?id=28752</p>										
Example issues/ example questions/ tasks being completed	<ol style="list-style-type: none"> 1. Configuration of WDM nodes for GMPLS control plane 2. Data concentration on edges of transport network 3. Procedures of resources discovery on ASON. 4. Routing in ASON. 5. Reliability of information transmission in OTN. 6. Configuration of LSP transport services in DWDM layer 7. Protection methods of transport services for LSP 8. Passive optical network distribution of multimedia services 											
Work placement	Not applicable											