



Subject card

Subject name and code	Telecommunication Systems and Networks I, PG_00048810						
Field of study	Electronics and Telecommunications						
Date of commencement of studies	October 2025		Academic year of realisation of subject		2026/2027		
Education level	first-cycle studies		Subject group		Obligatory subject group in the field of study 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	2		Language of instruction		Polish		
Semester of study	3		ECTS credits		3.0		
Learning profile	general academic profile		Assessment form		exam		
Conducting unit	Department Of Teleinformation Networks -> Faculty Of Electronics Telecommunications And Informatics -> Wydział Politechniki Gdańskiej						
Name and surname of lecturer (lecturers)	Subject supervisor		dr inż. Marcin Narloch				
	Teachers		dr inż. Marcin Narloch				
Lesson types and methods of instruction	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		3.0		42.0	75
Subject objectives	Transfer of knowledge on the basic principles of operation of the telecommunications network, its architecture, functional elements and implementation modalities of telecommunications services in combination with different techniques of switching and transmission.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		

Subject contents	<div>1. Aims and the definition of the telecommunication. The explanation of basic ideas</div> <div>2. The idea of the service. The information exchange system and his properties</div> <div>3. The network as realization of the information exchange system. The structure and functional elements</div> <div>4. Basic functions realized in the network: transmission, switching</div> <div>5. Problems of the network elements cooperation and the need of the standardization</div> <div>6. The classification criteria and the network characterization. Hierarchical and planar networks</div> <div>7. Service networks: telephone, computer, television</div> <div>8. The numbering and addressing in networks</div> <div>9. The relationship between: service, call scenario, connection</div> <div>10. The transfer of the information - attributes</div> <div>11. The circuits, packets and cells switching</div> <div>12. The idea of: teleservices, bearer services, supplementary services. Attributes and classification</div> <div>13. Grade and the quality of services</div> <div>14. Idea of telecommunication traffic and the traffic service resources. The Erlang formula to the calculation of the volume of resources</div> <div>15. The dynamic of traffic changes and its results for the grade and quality of the traffic service</div> <div>16. Resources and the optimisation of their utilization</div> <div>17. Multiplexing as the manner of the better utilization of resources. FDM, TDM, wavelengths, CDM multiplexing</div> <div>18. The idea of the transmission system and his properties</div> <div>19. The PCM30 system: multiplexing, signaling channels, track</div> <div>20. SDH system: properties of the system, tributary streams, multiplexing and assign of streams, optical interfaces</div> <div>21. WDM system: optical paths, multiplexing, optical track</div> <div>22. Synchronisation problem in the transmission network; the plesiochronous, synchronous and asynchronous network</div> <div>23. The distance of transmission for copper pair and optical fibres. Methods of the distance maximisation</div> <div>24. The transmission network as the response on the dynamics of the traffic changes and of the reliable service warranty</div> <div>25. The classification of transmission networks. Elements of the transmission network and their functionality</div> <div>26. SDH rings: one- and bi-directional, the circulation of streams in rings, the capacity of the ring</div> <div>27. (D)WDM rings: optical paths, the capacity of the ring</div> <div>28. Control in transmission networks</div> <div>29. Transmission distance and the transmission network synchronisation problems</div> <div>30. Design principles of the transmission network</div> <div>31. Control in telecommunication network. Service control and connection control. The routing function</div> <div>32. The service scenario. Idea of the user and control information</div> <div>33. ISO/OSI layered model of systems and devices cooperation. The use of the model in telecommunication</div> <div>34. PSTN /ISDN operator network - technics and services integration</div> <div>35. DSS1 signaling system</div> <div>36. SS7 - ISUP system and network signaling</div> <div>37. Example of the messages exchange scenario for the realisation of the service in PSTN/ISDN network</div> <div>38. Problem of the openness on new services. The intelligent network and its services</div> <div>39. Supporting of the mobility of users and its realisation in GSM operator network</div> <div>40. Internet as operator network for the realization of computers connections</div> <div>41. Evolution of the network: access, distribution, core</div> <div>42. Wire and wireless access</div> <div>43. Problems of the cooperation and convergence</div> <div>44. Characterisation of access and core networks solutions</div> <div>45. Perspectives of the development of telecommunication networks – NGN the next generation network and the Next Generation Internet</div> <div>46. Security and tariffication problems</div> <div>47. The management problem</div>		
Prerequisites and co-requisites			
Assessment methods and criteria	<div>Subject passing criteria</div> <div>written examination</div>	<div>Passing threshold</div> <div>50.0%</div>	<div>Percentage of the final grade</div> <div>100.0%</div>
Recommended reading	<div>Basic literature</div> <div>Supplementary literature</div> <div>eResources addresses</div>	<div>Material prepared by the lecturer, accessed in the xerocopy form</div> <div>Horak R. Telecommunications and data communications handbook, John Wiley & Sons, 2007</div> <div>Adresy na platformie eNauczanie:</div>	
Example issues/ example questions/ tasks being completed	<div>Bearer services and teleservices on ISDN network</div> <div>Principles of working for channel switching nodes and packet switching nodes</div> <div>Advantages and disadvantages of SDH network</div> <div>Synchronization of bit clocks in transmission networks</div> <div>Transmission protection in SDH networks and WDM networks</div> <div>Characteristics of NGN</div>		
Work placement	Not applicable		

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