GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	, PG_00058655
Field of study	Transport and Logistics

Date of commencement of studies	February 2023	Academic year of realisation of subject	2023/2024
Education level	second-cycle studies	Subject group	
Mode of study	Full-time studies	Mode of delivery	at the university
Year of study	1	Language of instruction	Polish
Semester of study	2	ECTS credits	4.0
Learning profile	general academic profile	Assessment form	assessment

Conducting unit	Department of Radiocommunication Systems and Networks -> Faculty of Electronics, Telecommunications and Informatics

Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Sławomir Gajewski
	Teachers	

Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	0.0	30.0	0.0	60
	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	60	0.0	0.0	60

Subject objectives	The aim of the course is to familiarise students with the basic properties, technical capabilities and operating principles of information, electronic and telecommunications systems in a transport.

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K7_U06] The student is able to notice their non-technical aspects, including environmental, economic and legal aspects when formulating and solving project tasks. Applies the principles of occupational health and safety	The student is able to assess the impact of IT, electronic and telecommunications systems on the environment and humans.	[SU3] Assessment of ability to use knowledge gained from the subject
	[K7_W02] The student has an extensive knowledge of modeling transport processes, including the knowledge necessary to describe and evaluate the functioning of selected elements of the transport system	The student has the knowledge of the functioning of electronic, telecommunications and IT systems as well as telematic systems in transport solutions. Can assess the suitability of these systems to support various types of transport processes.	[SW1] Assessment of factual knowledge [SW3] Assessment of knowledge contained in written work and projects
	[K7_U04] The student is able to use the known methods and mathematical models, as well as computer simulations to analyze, design and evaluate the functioning of transport systems or their components	The student is able to model and design system solutions based on cellular radiocommunication systems and V2V / V2X communication for the needs of transport systems.	[SU1] Assessment of task fulfilment [SU4] Assessment of ability to use methods and tools
	[K7_K02] The student is aware of the importance of non-technical aspects and the effects of engineering activities, including its impact on the natural environment and the related responsibility for decisions made	The student is aware of the importance of electronic, telecommunications and IT systems in the context of transport and people safety and the impact of these systems on the natural environment.	[SK5] Assessment of ability to solve problems that arise in practice
	[K7_U01] The student can obtain information from literature, databases and other, properly selected sources, also in English; is able to integrate the obtained information, interpret it, as well as draw conclusions and formulate and justify opinions	The student is able to use the knowledge of electronic, telecommunications, IT and telematic systems to design transport systems.	[SU2] Assessment of ability to analyse information [SU3] Assessment of ability to use knowledge gained from the subject

Subject contents	Introduction - basic concepts of telematics, telecommunications and computer science. Basic properties of the radio link. The basics of wireless technology and the principles of operation of the radio communication system. Telecommunications, sensor and electronic systems in a transport - classification. The importance of modern radio communications in transportation. Cellular radiocommunication systems and their role in the transport of the future. 2G, 3G and 4G cellular systems - architecture, properties, applications. Trunking and dispatching communication - basic properties. Radiocommunication systems in rail and urban transport: GSM-R, TETRA, DMR, LTE. Localisation systems in transportation - overview and general characteristics. GNSS systems: GPS, Glonass, Galileo. Maritime communications, emergency communications and security systems - GMDSS. Telematics systems and logistics services in maritime transport. Telematics, electronic and IT logistics services in road transport - examples and characteristics. Telematics, electronic and IT logistics services in rail transport - examples and characteristics. Prospects for transport development in light of the implementation of 5G cellular systems. Basic directions of radiocommunication development in transport systems towards 5G. ERTMS rail traffic control systems. Safety systems in land transport - the eCall system. Modern forms of the M2M communication and their importance in telematics and transport logistics. V2X systems - developing future communication between vehicles and infrastructure. Internet of Things and electronic-telecommunications systems in the Smart Cities infrastructure. Information systems in inland-water systems. The principles of Intelligent Transportation systems.
Prerequisites and co-requisites	

Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Project	50.0%	40.0%
	Written colloquium, 2 hours. If small number of studentes then oral colloquium is possible.	50.0%	60.0%

Recommended reading	Basic literature	1. Holma H., Toskala A. (editors): WCDMA for UMTS, HSPA Evolution and LTE, 4th ed., Wiley & Sons, 2007. 2. Holma H., Toskala A. (editors): LTE for UMTS, Evolution to LTEAdvanced, 2nd ed. Wiley and Sons, 2011. 3. El-Rabbany A., Introduction to GPS: The Global Positioning System. Artech House Publishers, 2006. 4. Stavroulakis P., Terrestrial Trunked Radio TETRA. A Global Security Tool. Series: Signals and Communication Technology. Springer, 2007. 5. Halonen T., Romero J, Melero J.: GSM, GPRS and EDGE Performance Evolution Towards 3G/UMTS, Wiley 2003. 6. Hasan S., F., Siddique N., Chakraborty S., Intelligent Transport Systems. 802.11-based Vehicular Communications. Springer 2018.
	Supplementary literature	1. Czajkowski J., Nowoczesne systemy GMDSS. Akademia Morska w Gdyni, 2005.
	eResources addresses	Adresy na platformie eNauczanie:

Example issues/ example questions/ tasks being completed	
Work placement	Not applicable