GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	TELEINFORMATION SYSTEMS AND TELEMATICS IN TRANSPORT, PG_00040992		
Field of study	Transport		
Date of commencement of studies	February 2023	Academic year of realisation of subject	2023/2024
Education level	second-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	1	Language of instruction	Polish
Semester of study	2	ECTS credits	3.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Department of Electrical Engineering of Transport -> Faculty of Electrical and Control Engineering		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Andrzej Wilk	
	Teachers	dr hab. inż. Andrzej Wilk dr hab. inż. Jacek Oskarbski dr inż. Aleksander Jakubowski	

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	30.0	0.0	15.0	0.0	0.0	45

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	45	5.0	25.0	75

Subject objectives

Student gets to know the different technical conditions for the use of telecommunication equipment in transportation environments. Acquire skills to design, software, and use of electronic devices and informatics equipment. Student distinguishes telematic transport systems, is able to describe the Intelligent Transport Systems (ITS). Students knows the methods of information exchange between systems and databases. Students select equipment to information, communications and telematics applications in transport systems.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_U11] able to design elements of transport infrastructure for road, rail, air and water, traction systems for urban transport and long-distance vehicles, apply advanced teleinformatic technologies in transport and logistic systems	Student selects the appropriate information, comunication and telematics technologies (ITS) in the control and management of transportation systems.	[SU1] Assessment of task fulfilment [SU3] Assessment of ability to use knowledge gained from the subject
[K7_W04] has basic knowledge of teleinformatic systems used in transport	Student apply information, comunication and telematics technologies in transport systems.	[SW3] Assessment of knowledge contained in written work and projects
[K7_U04] able to speak the science and technology language as customary in the transport community and in other related fields	Student is able to bind other directions techniques that are necessary for the application of teleinformatics and telematics systems in transport.	[SU1] Assessment of task fulfilment [SU4] Assessment of ability to use methods and tools

<table>
<tr><td>Subject contents</td><td>LECTURE: Types of data communication systems and their description. The information, coding and data compression. Properties of telecommunications systems. Computer networks: transmitters, receivers, transmission media. Data transmission protocols. Access network. Local and wide area networks LAN, WAN. Rules for connecting networks. Standards of transmission. Radio systems eg. GSM, VSAT, WiFi. Wireless sensor network WSN. Normalization. The architecture of modern telecommunications systems. Safety data. Applications of information technology in transport. Examples of information systems in transport. Directions of development of telecommunication technologies.

Data in transport management systems. Data quality issues. Data fusion. Detection quality. Quality of data processing. Problem of openness of ITS services and systems. Open data. Data exchange between systems, databases. Integration of control systems with traffic planning systems. Selected problems of ITS implementation in terms of data. LABORATORY: Processing of GNSS localisation data. Information and communication technologies in vehicles. Application of the programmable controllers. Remote measurements, analog-to-digital conversion and transmission of signals. Information encryption, steganography. Software tools for advanced evaluation of vehicles' energy consumption. Communication and control of the autonomous vehicle.</td></tr>
<tr><td>Prerequisites and co-requisites</td><td>Basic knowledge of electrical engineering and electronics, automatics and informatics.</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>Preparation, report from laboratory exercises</td><td>60.0%</td><td>30.0%</td></tr>
<tr><td>Midterm colloquium</td><td>60.0%</td><td>70.0%</td></tr>
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<tr><td>Recommended reading</td><td><table>
<tr><td>Basic literature</td><td>Gotfryd M.: Podstawy telekomunikacji telekomunikacja analogowa i cyfrowa. Rzeszów: Oficyna Wyd. Politechniki Rzeszowskiej, 2013. Fryśkowski B., Grzejszczyk E.: Systemy transmisji danych. Warszawa: WKŁ, 2010. Kabaciński W., Żal M.: Sieci telekomunikacyjne. Warszawa: WKŁ, 2008.</td></tr>
<tr><td>Supplementary literature</td><td>Simmonds A.: Wprowadzenie do transmisji danych. Warszawa: WKŁ, 1999. Wilamowski B. M., Irwin J. D (Eds.): Industrial communication systems. CRC Press, 2011. Katulski R. J.: Propagacja fal radiowych w sieciach 5G/IoT. Warszawa: WKŁ, 2021. Sutton R. J.: Bezpieczeństwo telekomunikacji. Praktyka i zarządzanie. Warszawa: WKŁ, 2012. Zieliński Ryszard J. Satelitarne sieci teleinformatyczne. Warszawa, WNT, 2016. Perallos A., Hernandez-Jayo U., Onieva E., García-Zuazola I. J. (Eds.): Intelligent transport systems: technologies and applications. Wiley, 2016.</td></tr>
<tr><td>eResources addresses</td><td>Adresy na platformie eNauczanie:
SYSTEMY TELEINFORMATYCZNE I TELEMATYKA W TRANSPORCIE - Moodle ID: 34644
https://enauczanie.pg.edu.pl/moodle/course/view.php?id=34644</td></tr>
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<tr><td>Example issues/ example questions/ tasks being completed</td><td>1. Draw a schematic diagram of the transmission path consisting of: a transmitter, a single pair of twisted cables UTP and a receiver.
2. Present the character "3" with ASCII code (code: 51 decimal) and insert into the frame of serial asynchronous data transmission. Take the following format: start bit, lsb ... msb bit, odd bit, one stop bit. Enter the character "3" in binary code. Draw the waveform of transmission of this character, if the data transmission speed is 19600 b/s. How long will it take to transmit this character?
3. Draw a schematic diagram and characterize the CAN bus.
4. What is the OSI model? Characterize the layers of the model.
5. Characterize the types of data in ITS systems.</td></tr>
<tr><td>Work placement</td><td>Not applicable</td></tr>
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