GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	ICT systems and telematics in transport, PG_00062424		
Field of study	Transport		
Date of commencement of studies	February 2024	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	1	ECTS credits	3.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Department of Transportation Engineering -> Faculty of Civil and Environmental Engineering		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Jacek Oskarbski	
	Teachers	dr inż. Aleksander Jakubowski mgr inż. Konrad Biszko dr hab. inż. Jacek Oskarbski dr hab. inż. Andrzej Wilk	

Lesson types and methods of instruction							
	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	15.0	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	10.0	20.0	75

Subject objectives	The student learns about the various technical considerations for the use of ICT equipment in transport. He/she acquires skills in the design, software and application of electronic devices and ICT equipment. The student distinguishes between telematic transport systems, is able to characterise intelligent transport systems (ITS). He knows the ways of data exchange between systems and databases. He/she selects equipment for ICT and telematics applications in transport.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_U01] creates innovative solutions to complex and unstructured problems, taking into account the variability of the environment by synthesizing information from many sources, using analytical, simulation and experimental methods	Selects innovative ICT and telematics (ITS) technologies in the control and management of transport systems taking into account the variability of the environment by synthesising information from multiple sources using analytical, simulation and experimental methods.	[SU1] Assessment of task fulfilment [SU2] Assessment of ability to analyse information [SU3] Assessment of ability to use knowledge gained from the subject [SU4] Assessment of ability to use methods and tools
[K7_K01] recognizes the importance of knowledge related to the field of study in solving cognitive and practical problems	The student applies ICT and telematics technologies in transport systems in solving cognitive and practical problems.	[SK2] Assessment of progress of work [SK3] Assessment of ability to organize work [SK5] Assessment of ability to solve problems that arise in practice
[K7_W01] identifies in an in-depth way phenomena related to the field of study as well as theories describing them and possible methods of analyzing processes occurring in the life cycle of technical systems	The student identifies ICT and telematics technologies in transport systems and the theories that describe them and the methods that can be used to analyse the processes involved in the life cycle of technical systems.	[SW1] Assessment of factual knowledge [SW2] Assessment of knowledge contained in presentation

Subject contents

LECTURE: Security and data protection in ICT: data protection methods, firewalls, security protocols, encryption and authentication.Transmission media: wired transmission, fiber optic connection, wireless transmission.Telecommunications system: digital signals, signal discretization, selected digital components.Computer networks in local connections: network devices, protocols, and addressingVehicle IT networks: CAN, LIN, MOST, Bluetooth, etc. Data in transport management systems. Data collection methods. Data quality issues. Data fusion. Detection quality. Open data. Data exchange between systems, databases. Integration of control systems with traffic planning systems. Selected problems of implementation of ITS systems in terms of data.LABORATORY:Processing of GNSS localisation data. Information and communication networks in vehicles. Application of the programmable controllers. Remote measurements, analog-to-digital conversion and wireless transmission of signals. Data security - cryptography and steganography. Software tools for advanced evaluation of vehicles' energy consumption. Communication and control of the autonomous vehicle.ExercisesElements of microscopic modelling using and analysing data from Intelligent Transport Systems services.

Prerequisites and co-requisites

Basic knowledge of electrical and electronic engineering, automation and computer science.

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Lecture colloquia	60.0%	60.0%
Preparation for the laboratory, completion of the report	60.0%	20.0%
Preparation for the exercise, completion of the report	60.0%	20.0%

Recommended reading

Basic literature	Gotfryd M.: Podstawy telekomunikacji telekomunikacja analogowa icyfrowa. 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.
Supplementary literature	Simmonds A.: Wprowadzenie do transmisji danych. Warszawa: WKŁ, 1999. Wilamowski B. M., Irwin J. D (Eds.): Industrial communicationsystems. CRC Press, 2011. Katulski R. J.: Propagacja fal radiowych wsieciach 5G/IoT. Warszawa: WKŁ, 2021. Sutton R. J.: Bezpieczeństwotelekomunikacji. 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 andapplications. Wiley, 2016.
eResources addresses	Adresy na platformie eNauczanie: Systemy Teleinformatyczne i Telematyka w Transporcie sem. Letni 2023/2024 - Moodle ID: 37239 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=37239

Example issues/ example questions/ tasks being completed

1. Draw a schematic diagram of a transmission line consisting of: a transmitter, a single pair oftwisted pair cables (UTP) and a receiver.2. represent character 3 by ASCII code (code: 51 decimal) and insert into a frame for serialasynchronous data transmission frame. Assume the following format: start bit, lsb bit ... msb, bitodd bit, one stop bit. Specify character 3 in binary code. Draw the transmission path of thischaracter if the data rate is 19600 b/s. How long will the transmission of thischaracter?3. draw a diagram and characterise the CAN bus.4. characterise the layers of the OSI model.5. characterise the data types in ITS systems.

Work placement	Not applicable

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