



Subject card

Subject name and code	ICT systems and telematics in transport, PG_00062424						
Field of study	Transport						
Date of commencement of studies	February 2025	Academic year of realisation of subject			2024/2025		
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						
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_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.		[SW2] Assessment of knowledge contained in presentation [SW1] Assessment of factual knowledge		
	[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.		[SK5] Assessment of ability to solve problems that arise in practice [SK3] Assessment of ability to organize work [SK2] Assessment of progress of work		
	[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.		[SU4] Assessment of ability to use methods and tools [SU3] Assessment of ability to use knowledge gained from the subject [SU2] Assessment of ability to analyse information [SU1] Assessment of task fulfilment		

Subject contents	<p>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 addressing. Vehicle 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. Exercises. Elements of microscopic modelling using and analysing data from Intelligent Transport Systems services.</p>		
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
	Preparation for the exercise, completion of the report	60.0%	20.0%
	Preparation for the laboratory, completion of the report	60.0%	20.0%
	Lecture colloquia	60.0%	60.0%
Recommended reading	Basic literature	Gotfryd M.: Podstawy telekomunikacji telekomunikacja analogowa icyfrowa. Rzeszów: Oficyna Wyd. Politechniki Rzeszowskiej, 2013. Fryškowski 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 communications 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.	
	eResources addresses	Adresy na platformie eNauczenie:	
Example issues/ example questions/ tasks being completed	<p>1. Draw a schematic diagram of a transmission line consisting of: a transmitter, a single pair of twisted pair cables (UTP) and a receiver. 2. represent character 3 by ASCII code (code: 51 decimal) and insert into a frame for serial asynchronous data transmission frame. Assume the following format: start bit, lsb bit ... msb, bit odd bit, one stop bit. Specify character 3 in binary code. Draw the transmission path of this character if the data rate is 19600 b/s. How long will the transmission of this character? 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.</p>		
Work placement	Not applicable		

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