



Subject card

Subject name and code	Data acquisition, processing and transmission systems, PG_00051705						
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					
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			assessment		
Conducting unit	Department of Power Electronics and Electrical Machines -> Faculty of Electrical and Control Engineering						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. inż. Andrzej Wilk				
	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	15.0	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		0.0		0.0	45
Subject objectives	<p>The main goal of this course is:</p> <ul style="list-style-type: none"> to give student the knowledge of data acquisition in modern transport. learning of student data processing methods and data collection in database for transport purposes, learning of student data transmission methods using interfaces applied in modern transport. 						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	[K7_W13] has advanced knowledge of the design and management of transport systems to an extent required of the specialty	Student is able to design a general system for acquisition, archiving and processing data from a transportation system			[SW3] Assessment of knowledge contained in written work and projects		
	[K7_W04] has basic knowledge of teleinformatic systems used in transport	Student has basic knowledge in the field of teleinformatics systems			[SW3] Assessment of knowledge contained in written work and projects		
	[K7_W05] has basic knowledge of control in transport systems	Student knows the basics of control in transportation systems			[SW3] Assessment of knowledge contained in written work and projects		
	[K7_U13] able to solve detailed problems of transport systems to an extent required of the specialty	Student is able to solve selected issues regarding data acquisition in transportation systems			[SU1] Assessment of task fulfilment		
	[K7_W04] has basic knowledge of teleinformatic systems used in transport	The student knows the basic IT systems in transport			[SW3] Assessment of knowledge contained in written work and projects		
	[K7_W05] has basic knowledge of control in transport systems	Student knows the basics of control in transportation systems			[SW3] Assessment of knowledge contained in written work and projects		
	[K7_W13] has advanced knowledge of the design and management of transport systems to an extent required of the specialty	The student has knowledge of data acquisition, transmission and data storing systems in the field relevant to the Transport specialization			[SW2] Assessment of knowledge contained in presentation		
	[K7_U13] able to solve detailed problems of transport systems to an extent required of the specialty	The student is able to design a data acquisition, transmission and processing system for a transport case study.			[SU4] Assessment of ability to use methods and tools		

Subject contents	<p>Lecture</p> <p>Selected aspects of signal processing. Electronic communication systems (Wide Area Network, Local Area Network, mobile communication systems, satellite based systems). Wired data transmission systems. Wireless data transmission systems. Data bus architecture in traction units and transmission protocols. Communication interfaces applied for transport purposes. Data Acquisition Systems DAQ. Virtual Machine Environment (VXI), PCI eXtensions for Instrumentation (PXI), Supervisory Control and Data Acquisition (SCADA) measurement systems. Databases for transport purposes. Creating and initializing of databases - an example of SQL server. Communication languages of databases - an example of Structural Query Language (SQL). Organization of information and data types in data bases. Methods of data edition and data processing in data bases.</p> <p>Laboratory</p> <p>Introduction to signals and their parameters. Mathematic principles of signal analysis. The Fourier series. Fourier Transform and Fourier integrals. Discretization of analog signals. Discrete Transform Fourier algorithms. Wave signal compression. Basics of analysis and data processing of 2D signals. Implementation of DSP algorithms for signal processors.</p> <p>Project</p> <p>Project on selected data acquisition, data processing and data transmission systems (team work)</p>											
Prerequisites and co-requisites	<p>Basic knowledge about principles of:</p> <ul style="list-style-type: none"> • electric metrology, • electrical and electronic engineering, • telecommunication. 											
Assessment methods and criteria	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 33%;">Subject passing criteria</th> <th style="width: 33%;">Passing threshold</th> <th style="width: 33%;">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td>Project</td> <td>60.0%</td> <td>50.0%</td> </tr> <tr> <td>Exam</td> <td>60.0%</td> <td>50.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	Project	60.0%	50.0%	Exam	60.0%	50.0%
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Recommended reading	Basic literature	<p>Gajek A., Juda Z.: Czujniki, WKŁ, Warszawa 2008.</p> <p>Simmonds A.: Wprowadzenie do transmisji danych, WKŁ, Warszawa, 1999.</p> <p>Fryskowiak B., Grzejszczyk E.: Systemy transmisji danych, WKŁ, Warszawa 2010.</p> <p>Zimmerman W., Schmidgail R.: Magistrale danych w pojazdach, WKŁ, Warszawa 2008.</p>										
	Supplementary literature	<p>Kehtarnavaz N.: Digital Signal Processing System Design: LabVIEW-Based Hybrid Programming, Elsevier, 2008.</p> <p>Zieliński T.: Cyfrowe przetwarzanie sygnałów. od teorii do zastosowań, WKŁ, Warszawa 2005.</p>										
	eResources addresses	<p>Adresy na platformie eNauczenie:</p> <p>Systemy Zbierania, Przetwarzania i Transmisji Danych - Moodle ID: 38735 https://enauczenie.pg.edu.pl/moodle/course/view.php?id=38735</p>										
Example issues/ example questions/ tasks being completed	<ol style="list-style-type: none"> 1. What are the major functional blocks of measurement system? 2. What is the structure of measurement system with Ethernet? 											
Work placement	Not applicable											