



Subject card

Subject name and code	Automatic and control engineering, PG_00044602						
Field of study	Transport						
Date of commencement of studies	October 2023	Academic year of realisation of subject				2024/2025	
Education level	first-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	2	Language of instruction				Polish	
Semester of study	4	ECTS credits				3.0	
Learning profile	general academic profile	Assessment form				assessment	
Conducting unit	Department of Electrified Transportation -> Faculty of Electrical and Control Engineering						
Name and surname of lecturer (lecturers)	Subject supervisor		dr inż. Sławomir Judek				
	Teachers		dr inż. Sławomir Judek				
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	15.0	0.0	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	Understanding of automatic control systems and control devices. The acquisition of the ability to solve simple problems of automation and control.						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	[K6_W06] has basic knowledge of economic processes, transport economics and transport management	Student describes dynamical systems, electrical, mechanical, electromechanical and liquid-level. Formulate mathematical models of linear dynamical systems in terms of continuous time and frequency domain. Determines the stability of linear dynamical systems. Chooses the control equipment to the set of application.-, including transport.			[SW1] Assessment of factual knowledge		
	[K6_U01] able to use technical documentation and literature, databases and other sources of transport related information; able to interpret information, make logical links and formulate opinions and conclusions based on the above	Able to use the technical literature on automation in the transport applications.			[SU3] Assessment of ability to use knowledge gained from the subject		
Subject contents	LECTURE Basic concepts of automation. Mathematical modeling of linear one-dimensional description of dynamic systems. Examples of control systems. The Laplace transform. Models of dynamic systems: electrical, mechanical, electromechanical and liquid-level. Continuous and discrete of control systems. Block diagrams. Linear feedback control systems functions, elements and structure, mathematical description, transfer functions, frequency domain characteristics, stability. Mathematical conditions of stability control system - stability criterion. PID controllers, tuning rules. Steady-state errors, dynamic errors, feedback control systems synthesis. Analysis and design of control systems with Matlab. Example problems and solutions. Controllability and observability. Introduction to nonlinear feedback control systems. Digital control algorithms. Equipments and components automation systems. Programmable control systems, computer aided control. supervisory Control And Data Acquisition SCADA. Intelligent Transport Systems. TUTORIALS Models of dynamic systems: electrical, mechanical, electromechanical, liquid-level systems. Mathematical models of continuous linear dynamic systems: time models (differential equations, state variables), models of frequency (transfer function, spectral transmittance), the basic dynamic units (inertialess, integrating, differential, inertial first and second row). The stability of dynamical systems: basic concepts, the study of stability, stability criteria. Programmable logic controllers PLC.						

Prerequisites and co-requisites	Basic knowledge of higher mathematics and physics.		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Practical exercise	60.0%	30.0%
	Midterm colloquium	60.0%	70.0%
Recommended reading	Basic literature	Kowal J.: Podstawy automatyki -tom 1. Kraków: AGH, Uczelniane Wydawnictwa Naukowo-dydaktyczne, 2006. Kowal J.: Podstawy automatyki - tom 2. Kraków: AGH, Uczelniane Wydawnictwa Naukowo-dydaktyczne, 2007. Kaczorek T., Dzieliński A., Dąbrowski W., Łopatka R.: Podstawy teorii sterowania. Warszawa: WNT, 2005.	
	Supplementary literature	Domachowski Z.: Automatyka i Robotyka. Podstawy. Gdańsk: Wydawnictwo PG, 2003.	
	eResources addresses	Adresy na platformie eNauczanie: Automatyka i sterowanie [2024/2025], stud. I stopnia, Transport, sem. 4 - Moodle ID: 43005 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=43005	
Example issues/ example questions/ tasks being completed	<ol style="list-style-type: none"> 1. What is transmittance? List its most important properties. 2. Specify the principle of selection of the PID controller. Draw a block diagram of the control system. 3. Draw and describe of the block diagram of programmable controller PLC. 		
Work placement	Not applicable		

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