GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Automatic and control engineering, PG_00044602		
Field of study	Transport		
Date of commencement of studies	October 2020	Academic year of realisation of subject	2021/2022
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 Electrical Engineering of Transport -> Faculty of Electrical and Control Engineering		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Krzysztof Karwowski	
	Teachers	dr hab. inż. Krzysztof Karwowski 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

Adresy na platformie eNauczanie:

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_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
[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

<table>
<tr><td>Subject contents</td><td>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. upervisory 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.</td></tr>
<tr><td>Prerequisites and co-requisites</td><td>Basic knowledge of higher mathematics and physics.</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>Practical exercise</td><td>60.0%</td><td>30.0%</td></tr>
<tr><td>Midterm colloquium</td><td>60.0%</td><td>70.0%</td></tr>
</table>
</td></tr>
<tr><td>Recommended reading</td><td>
<table>
<tr><td>Basic literature</td><td>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.</td></tr>
<tr><td>Supplementary literature</td><td>Domachowski Z.: Automatyka i Robotyka. Podstawy. Gdańsk: Wydawnictwo PG, 2003.</td></tr>
<tr><td>eResources addresses</td><td></td></tr>
</table>
</td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td>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.</td></tr>
<tr><td>Work placement</td><td>Not applicable</td></tr>
</table>