

Subject card

Subject name and code	Automation and robotics, PG_00040065							
Field of study	Mechanical Engineering							
Date of commencement of studies	October 2021		Academic year of realisation of subject			2023/2024		
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	Part-time studies		Mode of delivery			at the university		
Year of study	3		Language of instruction			Polish		
Semester of study	5		ECTS credits			4.0		
Learning profile	general academic profile		Assessment form			exam		
Conducting unit	Institute of Mechanics and Machine Design -> Faculty of Mechanical Engineering and Ship Technology						hnology	
Name and surname	Subject supervisor		dr hab. inż. Rafał Hein					
of lecturer (lecturers)	Teachers		dr hab. inż. Rafał Hein					
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Projec			SUM
	Number of study hours	15.0	0.0	8.0	0.0		0.0	23
	E-learning hours inclu	uded: 0.0				i		
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	23		5.0		72.0 100		100
Subject objectives	Presentation of the fundamental issues related to automatic control systems, robots and manipulators. Knowing the structure and components of a typical control system. Gaining general information about the methods of designing, analysis and study of the properties of typical control systems. Acquisition of knowledge about the construction of typical, industrial robots and manipulators. Learning of methods for modeling, analysis and control of robots.							
Learning outcomes	Course outcome		Subject outcome			Method of verification		
	[K6_W06] possesses elementary knowledge on automatics and robotics of mechanical systems		Student knows the structure of a typical automation system and its components			[SW1] Assessment of factual knowledge		
			Student is able to build, design and analyze basic automatic control systems with the typical, universal industrial controllers.			[SU3] Assessment of ability to use knowledge gained from the subject		
Subject contents Prerequisites	Definition of basic terms. General structure of control system. Classification and examples of control system elements. Analog and digital control systems. Basic information about digital control systems. Boolean algebra. Combinational logic system. Sequential logic system. Design, synthesis and analysis of digital control systems. Basic information about analog control systems. A typical connections of components. Block diagrams and their transformations. Feedback. Description and classification of signals. Standard signals. Method of description control systems, elements and signals. Application of the Laplace transformation. Concept of transfer function. Static and dynamic characteristics of control systems. Time responses. Frequency characteristics. Nyquist and Bode plots. Controllers. Tuning of PID controller. Classification of robots and manipulators. Construction, modeling and analysis of robot motion. Introduction to robot control systems. The sensors used in industrial robots. Fundamentals of programming robots. Application of robots. Laboratory: Design of combinational and sequential logic circuits. Time and frequency characteristics of selected control system components. Modeling and simulation of control systems and robots. Mathematics, Physics, Mechanics							
and co-requisites								

Data wydruku: 10.04.2024 18:22 Strona 1 z 2

Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade			
	Laboratory (reports from laboratory exercises)	56.0%	30.0%			
	Written exam	56.0%	70.0%			
Recommended reading	Basic literature	1. Holejko D., Kościelny W.J.: Automatyka procesów ciągłych, Oficyna Wydawnicza Politechniki Warszawskiej, 2012,				
		2. Żelazny M.: Podstawy automatyki, Państwowe Wydawnictwo Naukowe, 1976,				
		3. Perycz S.: Podstawy automatyki. Skrypt PG, Gdańsk 1983,				
		4. Węgrzyn S.: Podstawy automatyki. PWN Warszawa, 1978,				
		5. Jarzębowska E.: Podstawy dynamiki mechanizmów i manipulatorów. Oficyna Wydawnicza PW. Warszawa 2002,				
		6. Morecki A., Knapczyk J., Kędzior K.:Teoria mechanizmów i manipulatorów. WNT. Warszawa 2002,				
		7. Graig J.J.: Wprowadzenie do robotyki. Mechanika i sterowanie. WNT. Warszawa 1993.				
	Supplementary literature	Kaczorek T.: Teoria układów regulacji automatycznej. WNT Warszawa 1974,				
		Morecki A., Knapczyk J.: Podstawy robotyki. Teoria i elementy manipulatorów i robotów. WNT. Warszawa 1993.				
	eResources addresses	Adresy na platformie eNauczanie:				
Example issues/ example questions/ tasks being completed						
Work placement	Not applicable					

Data wydruku: 10.04.2024 18:22 Strona 2 z 2