

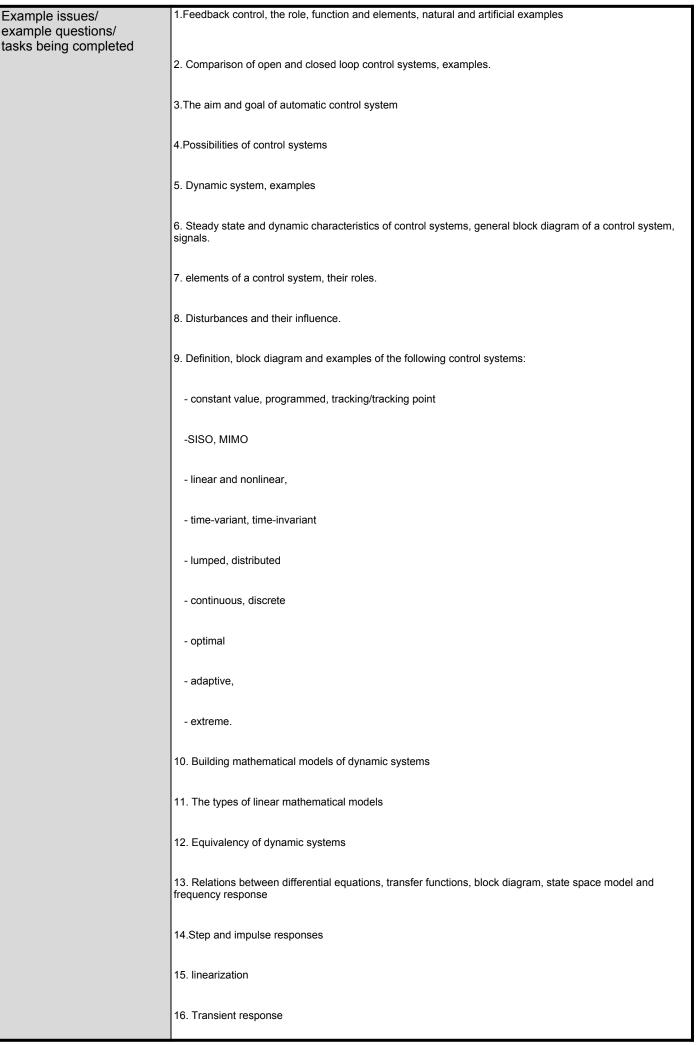
Subject card

Subject name and code	Fundamentals of Atomation, PG_00042061								
Field of study	Power Engineering, Power Engineering, Power Engineering, Power Engineering, Power Engineering								
Date of commencement of studies	October 2020		Academic year of realisation of subject			2022/2023			
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	3		Language of instruction			Polish N/A			
Semester of study	5		ECTS credits			6.0			
Learning profile	general academic profile		Assessment form			exam			
Conducting unit	Faculty of Ocean Eng	ineering and S	hip Technolog	у					
Name and surname	Subject supervisor dr inż. Mohammad Ghaemi								
of lecturer (lecturers)	Teachers		dr inż. Mohammad Ghaemi						
		mgr inż. Damian Jakowski							
Lesson types and methods	Lesson type	Lecture	Tutorial	Laboratory	Projec	t	Seminar	SUM	
of instruction	Number of study hours	30.0	15.0	30.0	0.0		0.0	75	
	E-learning hours inclu	uded: 0.0	•	•	•	-		•	
	 part of the study program for students of Power Engineering, cohort Energy Technologies, will be delivered online. The lecture will be conducted on the e-Learning platform of GUT. All information and materials for this lecture are available on this platform. The lectures will be delivered in accordance with your study plan available on <i>moja.pg</i>, i.e. on Monday from 9 till 11. Classes are conducted in the form of a webinar, and the recordings of the webinars will be made available successively. All webinars are set up as "meeting", which means that any participant can join the discussion and ask questions at any time. Two forums are available. The discussion forum can be used for discussions between the participants, while the Q&A forum is used for asynchronous consultation with me. Due to the current pandemic situation, it is impossible to inform you in advance about the type of exam, I will inform you about it later. The preferred scheme, however, is organizing the exam at the university, not online. Questions can also be sent by e-mail to me: ghaemi@pg.edu.pl. In-person consultation at the university is possible each Monday from 13:15 till 15:00 in Room 173 located at the Faculty of Ocean Engineering and Ship Technology, first floor. 								
Learning activity and number of study hours	Learning activity	Participation in classes include plan		Participation i consultation h			udy	SUM	
	Number of study hours	75		10.0	0.0			150	
Subject objectives	Gaining the knowledge about fundamental concepts of control systems and robotics including system modeling and representation, analysis and synthesis, as well as technical solutions. Ability of implementation and application of control systems in industrial and engineering processes and systems.								
Learning outcomes	Course outcome		Subject outcome		Method of verification				
	K6_W03		Knows the basics of control systems and automatic regulation, including the necessary rules for the selection of related devices and components.			[SW3] Assessment of knowledge contained in written work and projects [SW1] Assessment of factual knowledge			
	K6_W06		He knows the basic concepts and principles of analysis, synthesis, operation and evaluation of simple technical automation systems, important for power engineering systems.			[SW3] Assessment of knowledge contained in written work and projects [SW1] Assessment of factual knowledge			

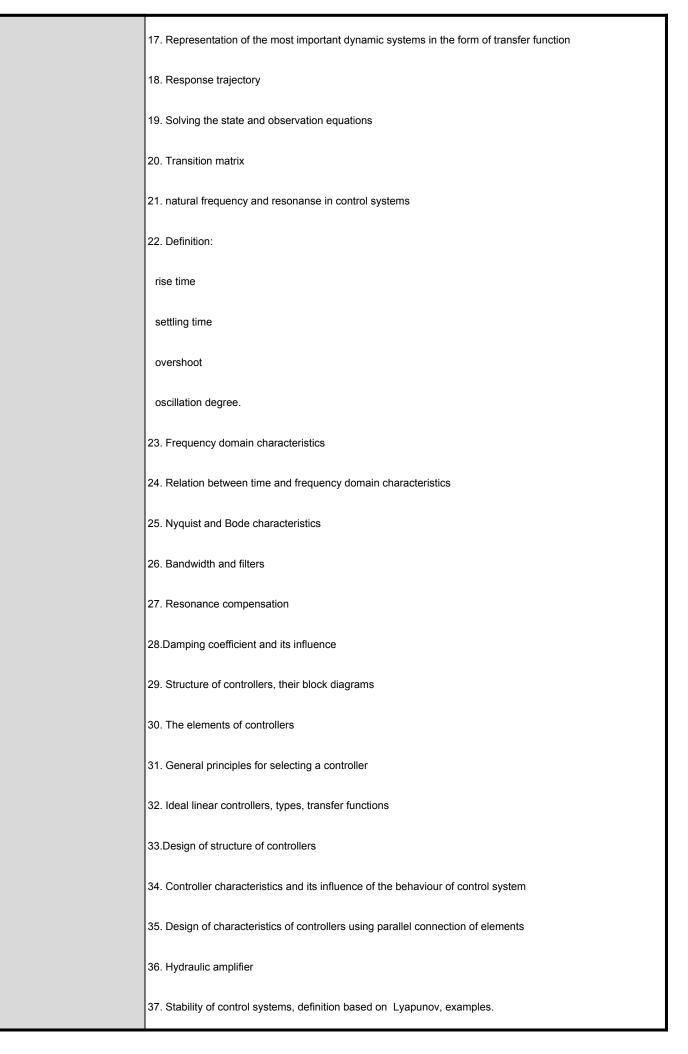
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Subject contents	1. Introduction and principal definitions 2. Classification of control systems 3. Modelling of dynamic systems and description of elements of control systems 4. Mathematical model presentation: differential equation, transfer function, block diagram, state and observation equations; model transformation 5. Transient function and time characteristics 6. Feedback control 7. Analisis of control systems in time and frequency domains 8. Stability 9. Controllers and principles of their selection and design 10. Quality of control systems 11. Discrete control systems						
Prerequisites and co-requisites	Preceding subjects: 1. Mathematics 2. Physics 3. Technical mechanics						
Assessment methods	Subject passing criteria	Passing threshold	Percentage of the final grade				
and criteria	class tests	51.0%	20.0%				
	Written colloquiums, oral egzamination	56.0%	50.0%				
	Lab.	51.0%	30.0%				
Recommended reading	Basic literature	1. Domachowski Z., Automatyka i robotyka – podstawy, Wydawnictwo PG, Gdańsk, 2003. 2. Nise N. S., Control system engineering, John Whiley & Sons Inc., 2000. 3. Próchnicki W., Dzida M., Zbiór zadań z podstaw automatyki, skrypt dla studentów Wydziału Oceanotechniki i Okrętownictwa PG, Gdańsk, 1993.					
	Supplementary literature	 Friedland B., Control System Design, McGraw Hill Co., 1986. Bubnicki Z., Teoria i algorytmy sterowania, Wydawnictwo Naukowe PWN, Warszawa, 2002. Kaczorek T., Teoria sterowania i systemów, Wydawnictwo Naukowe PWN, Warszawa, 1999. Ogata K., Modern Control Engineering, 4th edition, Prentice Hall, 2002. Perycz S., Podstawy automatyki, skrypt dla Instytutu Okrętowego PG, Gdańsk, 1983. Raven, F. H., Automatic control engineering, McGraw Hill Co., 1986. 					
	eResources addresses	Adresy na platformie eNauczanie: Podstawy automatyki, W/ĆW, Energetyka, sem.05, zimowy 22/23 (PG_00042061) - Moodle ID: 26197 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=26197					

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	38. Stability of control systems
	39. How stability is affected by the conditions
	40. Characteristic equation of a control system
	41.Stability checking based on the roots of characteristic equation
	42. The reason for which we use stability criteria
	43. Routh-Hurwitz stability criterion
	44. Nyquista stability criterion
	45. Stability margins
	46.Steady-state error, way of calculation
	47. Relation between the controller parameters and steady state error
	48. Optimization of control system
	49. Quality of control system
	50 General information about discrete control systems
Work placement	Not applicable

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