GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Control Theory, PG_00057473		
Field of study	Automation, Robotics and Control Systems		
Date of commencement of studies	February 2027	Academic year of realisation of subject	2026/2027
Education level	second-cycle studies	Subject group	
Mode of study	Full-time studies	Mode of delivery	at the university
Year of study	1	Language of instruction	Polish
Semester of study	1	ECTS credits	5.0
Learning profile	general academic profile	Assessment form	exam
Conducting unit	Department of Intelligent and Decision Support Systems -> Faculty of Electrical and Control Engineering -> Faculties of Gdańsk University of Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Robert Piotrowski	
	Teachers		

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	45.0	0.0	0.0	15.0	0.0	60

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	60	10.0	55.0	125

Subject objectives

The aim of the course is to present the current achievements of the control theory for the different categories of control systems, e.g.: continuous - discrete, linear - nonlinear, deterministic - stochastic. It will be present the results of modern control theory and the most important results of control theory.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_W06] has an extended knowledge of the design of automation components and devices, control and decision support systems control and decision support systems and complex mechatronic systems	1. The student knows the classical and modern control methods. 2. The student designs and analyzes the effect of the selected control system.	[SW3] Assessment of knowledge contained in written work and projects
[K7_U07] is able to use analytical, simulation and experimental methods to formulate and solve engineering tasks and simple research problems in the field of automation and robotics	1. The student selects the control algorithm to the control task. 2. The student examines the control systems (simulation tests).	[SU3] Assessment of ability to use knowledge gained from the subject [SU4] Assessment of ability to use methods and tools

Subject contents	Course content – lecture **Lecture:** 1. Organisation and programme of the course. Selected structures of control systems. 2. Description of dynamic systems and responses. 3. Stability, controllability/reachability, observability/reproducibility of dynamic systems. 4. Control of a dynamic system - pole allocation method. 5. Control of a dynamic system - pole allocation method - application of integral action. 6. control of a dynamic system - LQR method. 7 Control of a dynamic system - deadbeat method. 8 State observation - full observers. 9. state observation - reduced observers. Course content – project **Project:** 1. Basic properties of dynamic systems - observability, controllability, stability. Responses of linear control systems. 2. Control with coupling from state - pole allocation methods. Control with integral action. 3 State vector reproduction - Luenberger observer.
Prerequisites and co-requisites	No requirements.
Assessment methods and criteria	

Subject passing criteria	Passing threshold	Percentage of the final grade
Exam	50.0%	70.0%
Project	50.0%	30.0%

Recommended reading	Basic literature	1. Byrski W. Obserwacja i sterowanie w systemach dynamicznych. Uczelniane Wydawnictwa Naukowo Dydaktyczne Akademii Górniczo Hutniczej w Krakowie, 2007. 2. Hendricks, E., Jannerup, O., Sorensen, P.H. (2008). Linear Systems Control, Deterministic and Stochastic Methods. Springer Verlag.

	Supplementary literature	1. Ostertag, E. (2011). Mono- and Multivariable Control and Estimation. Springer Verlag. 2. Fen, L. (2007). Robust Control Design - An Optimal Control Approach. John Wiley & Sons.
	eResources addresses	
Example issues/ example questions/ tasks being completed	1. For a given pair of matrices (A, C) use Ackermann formula and calculate the matrix G, providing the specified allocation of the eigenvalues of the observer error dynamics.	
Practical activites within the subject	Not applicable	

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