



## Subject card

Subject name and code	Fundamentals of Control, PG_00056914						
Field of study	Electrical Engineering						
Date of commencement of studies	October 2023	Academic year of realisation of subject			2024/2025		
Education level	first-cycle studies	Subject group					
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			4.0		
Learning profile	general academic profile	Assessment form			assessment		
Conducting unit	Department of Controlled Electric Drives -> Faculty of Electrical and Control Engineering						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. inż. Arkadiusz Lewicki				
	Teachers						
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	30.0	0.0	0.0	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		5.0		35.0	100
Subject objectives	Providing knowledge of the basics of automation, in particular knowledge covering linear control systems, methods of their description, analysis and synthesis						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	K6_W08		The student knows the concept of a control system and knows the properties of the basic elements of automation. Can check the stability. Knows the basic designs of regulators		[SW1] Assessment of factual knowledge		
	K6_U07		The student is able to select a control system and analyze its behavior		[SU4] Assessment of ability to use methods and tools		
Subject contents	<p>Types of control systems, Basic diagram of the automatic control system, Practical examples of various automatic control systems, Definition of a linear system and a nonlinear system. Laplace transform, the concept of transmittance Types of signals: unit step, Dirac function, sinusoidally variable signal, Transforming block diagrams described using transfer functions, transferring the hitch and sum nodes, Description of the basic elements of the automatic control system, types of characteristics: phase and phase amplitude characteristics, logarithmic characteristics, Bode plots, Stability of linear automatic control systems: a. definition of stability, asymptotic and exponential, Approximation of a nonlinear system at the operating point, examples, Lyapunov's first law of stability, Stability criteria: algebraic, graphical and graphical-analytical with examples. Quality of automatic control systems: a. definition of error coefficients and method of their determination, error in the steady state, integral criteria of control quality Static and astatic systems, regulation time and overshoot, Module reserve and phase reserve, Regulators: a. various types of regulators and their characteristics, definition of basic regulator settings, methods of selecting regulator settings. Hysteresis and two-position control</p>						
Prerequisites and co-requisites	Knowledge of mathematics and basic electrical engineering.						

Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Colloquia during classes	60.0%	50.0%
	Students' own studies on the subject	60.0%	50.0%
Recommended reading	Basic literature	<p>M. Żelazny: Podstawy automatyki, PWN, 1976.</p> <p>M. Ferenc: Podstawy automatyki, Wydaw. Politechniki Opolskiej, 200</p> <p>A.Urbaniak: Podstawy automatyki, Wyd. Politechniki Poznańskiej, Poznań, 2001</p> <p>H. Bishop: Modern control systems, Dorf R.C., Addison-Wesley Publ. Co., 1995</p> <p>Kowal: Podstawy automatyki, Uczelniane Wydawnictwa Naukowo-Dydaktyczne AGH</p> <p>Markowski, J. Kostro, A. Lewandowski: Automatyka w pytaniach i odpowiedziach, WNT</p> <p>Rumatowski: Podstawy Automatyki, Wydawnictwo Politechniki Poznańskiej 2004</p> <p>Greblicki: Podstawy Automatyki Oficyna Politechniki Wrocławskiej 2006</p> <p>Horla: Podstawy Automatyki. Ćwiczenia rachunkowe cz. I i II, Wydawnictwo P. Poznańskiej 2004</p> <p>Kaczorek, A.Dzieliński, W. Dąbrowski, R. Łopatka: Podstawy Teorii Sterowania, WNT 2007</p>	
	Supplementary literature	<p>P. De Larminat, Yves Thomas, Automatyka układy liniowe, tom 1, Sygnały i układy, Wydawnictwa Naukowo - Techniczne, 1983</p> <p>W. Findeisen, Technika regulacji automatycznej, PWN, 1965</p> <p>T. Kaczorek, Teoria układów regulacji automatycznej, Wydawnictwa Naukowo ? T</p>	
	eResources addresses	Adresy na platformie eNauczanie:	
Example issues/ example questions/ tasks being completed	<p>Test the stability of the system Determine the stability margin Determine the equivalent transmittance of the system</p>		
Work placement	Not applicable		