



Subject card

Subject name and code	Automatic Control & Robotics, PG_00046326						
Field of study	Electronics and Telecommunications, Informatics, Automatic Control, Cybernetics and Robotics						
Date of commencement of studies	October 2021	Academic year of realisation of subject			2021/2022		
Education level	second-cycle studies	Subject group			Obligatory subject group in the field of study		
Mode of study	Full-time studies	Mode of delivery			at the university		
Year of study	1	Language of instruction			English		
Semester of study	1	ECTS credits			5.0		
Learning profile	general academic profile	Assessment form			exam		
Conducting unit	Department of Automatic Control -> Faculty of Electronics, Telecommunications and Informatics						
Name and surname of lecturer (lecturers)	Subject supervisor		dr inż. Piotr Kaczmarek				
	Teachers		dr inż. Piotr Kaczmarek				
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	10.0	0.0	0.0	40
	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	40	17.0		68.0	125	
Subject objectives	Introduction of the methods of dynamic systems analysis and the synthesis of basic control systems using feedback.						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	[K7_U06] can analyse the operation of components, circuits and systems related to the field of study; measure their parameters; examine technical specifications; interpret obtained results and draw conclusions	Student is able to model dynamic systems			[SU4] Assessment of ability to use methods and tools		
	[K7_W03] Knows and understands, to an increased extent, the construction and operating principles of components and systems related to the field of study, including theories, methods and complex relationships between them and selected specific issues - appropriate for the curriculum.	Student is able to design feedback systems			[SW1] Assessment of factual knowledge		

Subject contents	<p>1. Introduction to automatic control systems. Feedback systems. Basic functional elements of the closed control system (regulation).</p> <p>2. Mathematical models of continuous time dynamic systems. Linearization of nonlinear models.</p> <p>3. Linear models: transfer functions and description in the state space.</p> <p>4. Stability of linear control systems. Algebraic stability criteria (Routh-Hurwitz criterion).</p> <p>5. Transient processes in control systems and static control accuracy (fixed errors). First and second order dynamic members.</p> <p>6. Quality control indicators in time domain.</p> <p>7. Basic limitations of the synthesis of automatic control systems. Impact of feedback on control system properties.</p> <p>8. Root lines as a tool for analyzing dynamic systems with feedback.</p> <p>9. Principle of proportional control and dynamic compensation (accelerating and decelerating elements).</p> <p>10. Frequency characteristics of linear dynamic systems. Nyquist criterion for stability of feedback systems. Control quality indicators in the frequency domain.</p> <p>11. Basics of control system synthesis based on frequency methods - the principle of correction of frequency characteristics of an open system.</p> <p>12. The use of software supporting the design of control systems</p>											
Prerequisites and co-requisites	Advanced knowledge of mathematics and physics											
Assessment methods and criteria	<table border="1"> <thead> <tr> <th data-bbox="456 819 794 846">Subject passing criteria</th> <th data-bbox="799 819 1137 846">Passing threshold</th> <th data-bbox="1142 819 1481 846">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="456 853 794 880">Written test</td> <td data-bbox="799 853 1137 880">55.0%</td> <td data-bbox="1142 853 1481 880">50.0%</td> </tr> <tr> <td data-bbox="456 887 794 913">Implementation of a computer task</td> <td data-bbox="799 887 1137 913">55.0%</td> <td data-bbox="1142 887 1481 913">50.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	Written test	55.0%	50.0%	Implementation of a computer task	55.0%	50.0%
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Recommended reading	<p>Basic literature</p> <p>Supplementary literature</p> <p>eResources addresses</p>	<p>J. Nowakowski "Podstawy Automatyki" tom 1, Skrypt PG</p> <p>F. Golnaraghi, B. C. Kuo "Automatic Control Systems" Willey 2010</p> <p>K. Ogata "Modern Control Engineering"</p>										
Example issues/ example questions/ tasks being completed												
Work placement	Not applicable											