GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Automatic Control & Robotics, PG_00064150		
Field of study	Electronics and Telecommunications, Informatics, Automatic Control, Cybernetics and Robotics		
Date of commencement of studies	October 2024	Academic year of realisation of subject	2024/2025
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. Artur Gańcza dr inż. Marek Tatara	

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	8.0	77.0	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_U12] is able, to an increased extent, to analyze the operation of components and systems related to the field of study, as well as to measure their parameters and study their technical characteristics, and to plan and carry out experiments related to the field of study, including computer simulations, interpret the obtained results and draw conclusions	The student knows the taught methods of analysis and synthesis of control systems and understands their relationships.	[SU1] Assessment of task fulfilment
[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

<table>
<tr><td>Subject contents</td><td>1. Introduction to automatic control systems. Feedback systems. Basic functional elements of the closed control system (regulation).

2. Mathematical models of continuous time dynamic systems. Linearization of nonlinear models.

3. Linear models: transfer functions and description in the state space.

4. Stability of linear control systems. Algebraic stability criteria (Routh-Hurwitz criterion).

5. Transient processes in control systems and static control accuracy (fixed errors). First and second order dynamic members.

6. Quality control indicators in time domain.

7. Basic limitations of the synthesis of automatic control systems. Impact of feedback on control system properties.

8. Root lines as a tool for analyzing dynamic systems with feedback.

9. Principle of proportional control and dynamic compensation (accelerating and decelerating elements).

10. Frequency characteristics of linear dynamic systems. Nyquist criterion for stability of feedback systems. Control quality indicators in the frequency domain.

11. Basics of control system synthesis based on frequency methods - the principle of correction of frequency characteristics of an open system.

12. The use of software supporting the design of control systems</td></tr>
<tr><td>Prerequisites and co-requisites</td><td>Advanced knowledge of mathematics and physics</td></tr>
<tr><td>Assessment methods and criteria</td><td><table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>Implementation of a computer task</td><td>55.0%</td><td>50.0%</td></tr>
<tr><td>Written test</td><td>55.0%</td><td>50.0%</td></tr>
</table></td></tr>
<tr><td>Recommended reading</td><td><table>
<tr><td>Basic literature</td><td>J. Nowakowski "Podstawy Automatyki" tom 1, Skrypt PG

F. Golnaraghi, B. C. Kuo "Automatic Control Systems" Willey 2010</td></tr>
<tr><td>Supplementary literature</td><td>K. Ogata "Modern Control Engineering"</td></tr>
<tr><td>eResources addresses</td><td>Adresy na platformie eNauczanie:
2024/2025_ZIMA Automatic Control & Robotics - Moodle ID: 41725
https://enauczanie.pg.edu.pl/moodle/course/view.php?id=41725</td></tr>
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<tr><td>Example issues/ example questions/ tasks being completed</td><td></td></tr>
<tr><td>Work placement</td><td>Not applicable</td></tr>
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