GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Control System Structures, PG_00016960
Field of study	Automation, Robotics and Control Systems

Date of commencement of studies	February 2023	Academic year of realisation of subject	2023/2024
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	2	ECTS credits	4.0
Learning profile	general academic profile	Assessment form	exam

Conducting unit	Department of Controlled Electric Drives -> Faculty of Electrical and Control Engineering

Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Marek Adamowicz
	Teachers	dr hab. inż. Marek Adamowicz
		dr hab. inż. Elżbieta Bogalecka

Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	15.0	0.0	0.0	45
	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	45	10.0	45.0	100

Subject objectives	goal is to be able to choose the structure of the control system depending of the requirements for control quality, design and study of the control system properties

Learning outcomes	Course outcome	Subject outcome	Method of verification
	K7_W14	the student understands a technical text and a scientific text describing the implementation of a complex control algorithm and is able to present it in a linguistically and substantively correct form.	[SW2] Assessment of knowledge contained in presentation [SW1] Assessment of factual knowledge
	K7_U07	the student, using the knowledge acquired in the course, is able to properly perform the task using theoretical knowledge and simulation tools. the student is able to process and analyze research results and present them in the form of a report.	[SU4] Assessment of ability to use methods and tools [SU3] Assessment of ability to use knowledge gained from the subject [SU5] Assessment of ability to present the results of task
	K7_K06	the student understands the importance of decisions made regarding the regulatory system and the consequences of these decisions. The student is able to present the results of work using correct terminology.	[SK4] Assessment of communication skills, including language correctness [SK5] Assessment of ability to solve problems that arise in practice

Subject contents	Classification of control systems. Formulating control problem. Modeling of control systems including actuator, sensors and restrictions. Structures of control systems: multiloop, open vs. closed control, with feedback from the output and from the state variables, with reference model, with disturbance compensation, sliding control. . Estimator in the control system structure. Robust control, design rules, parametric sensitivity. Principles for design of complex control structures. Selected unconventional controllers. Digital implementation of control algorithm. Control systems of selected objects: with important delay and weak damped.
Prerequisites and co-requisites	Basic knowledge of control theory, metrology, microprocessor technology, matematics

Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Laboratory reports	60.0%	50.0%
	Exam	50.0%	50.0%

Recommended reading	Basic literature	1. Kaczorek T., Dzieliński, Dąbrowski, Łopatka: Podstawy teorii sterowania,PWN 2009. 2. Tatjewski P.: Sterowanie zaawansowane obiektów przemysłowych. Struktury i Algorytmy. Warszawa. 3. Bubnicki: Teoria i algorytmy sterowania, PWN, 2005.
	Supplementary literature	1. Bodgan Wilamowski; J. David Irwin: Control and mechatronics, CRC Press, Taylor&Francis Group, 2011. 2. Bogdan M. Wilamowski; J. David Irwin: Intelligent systems, CRC Press, Taylor&Francis Group, 2011.
	eResources addresses	Adresy na platformie eNauczanie: STRUKTURY UKŁADÓW STEROWANIA [2023/24] - Moodle ID: 32226 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=32226

Example issues/ example questions/ tasks being completed	1. Explain the control system structure based on MRAS method, 2 . Applications of the sliding control method. 3. How is the open loop control system based on "input shaping" designed

Work placement	Not applicable