GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	, PG_00052095					
Field of study	Nanotechnology					
Date of commencement of studies	October 2022		Academic year of realisation of subject	2024/2025		
Education level	first-cycle studies		Subject group	Optional subject group / Subject group related to scientific research in the field of study		
Mode of study	Full-time studies		Mode of delivery	at the university		
Year of study	3		Language of instruction	Polish		
Semester of study	6		ECTS credits	4.0		
Learning profile	general academic profile		Assessment form	assessment		
Conducting unit	Zakład Mechatroniki -> Institute of Mechanics and Machine Design -> Faculty of Mechanical Engineering and Ship Technology					
Name and surname of lecturer (lecturers)	Subject supervisor	prof. dr hab. inż. Krzysztof Kaliński				
	Teachers	dr inż. Natalia Stawicka-Morawska / prof. dr hab. inż. Krzysztof Kaliński				

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	5.0	50.0	100

Subject objectives	Familiarizing students with the modeling of mechatronic systems

Learning outcomes	Course outcome	Subject outcome	Method of verification
	K6_U04	The student develops models physical layouts mechatronics	[SU4] Assessment of ability to use methods and tools / [SU5] Assessment of ability to present the results of task
	K6_W09	The student identifies phenomena related to functioning mechatronic systems	[SW1] Assessment of factual knowledge
	K6_U05	The student recognizes the methods modeling the structure of systems and mechatronics observed signals	[SU1] Assessment of task fulfilment / [SU4] Assessment of ability to use methods and tools

Subject contents	**Vibrations of systems with one degree of freedom.** Free vibrations without damping. Free vibrations with viscous damping. Forced harmonic vibrations. **Vibrations of systems with two degrees of freedom.** Free vibrations. Forced vibrations. Elimination of mechanical vibrations. **Discrete modeling**. Fundamentals of the finite element method. The concept of modal models. **Modeling control systems**. Modal control at energy performancey index. Design of control systems. Selection of poles of the controlled system. **Examples of modeling mechatronic system**s. Robot carrying system. Supervising vibrations of rail vehicle pantographs.

Prerequisites and co-requisites	Knowledge and skills in the subjects "Solid State Mechanics" and "Mechatronic Design"

Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Lecture - 2 written colloquia	50.0%	66.67%
	Passing the laboratory	100.0%	33.33%

Recommended reading	Basic literature	1. Heimann B., Gerth W., Popp K.: Mechatronics. Components methods examples. Warsaw: PWN Scientific Publishing House 2001. 2. Gawrysiak M.: Mechatronics and mechatronic design. Białystok: Białostocka Polit. Publishing House 1997. (is available on the internet) 3. Cannon R. H.: Dynamics of physical systems. Warsaw: WNT 1973. 4. Kaliński K. J.: Supervision of dynamic processes in mechanical systems. Gdańsk: Gdańsk University of Technology Publishing House 2012. 5. Kruszewski J., Wittbrodt E.: Vibrations of mechanical systems in a computer approach. Volume I. Linear problems. Warsaw: WNT 1995. 6. Kaczorek T.: Control and systems theory. Warsaw: PWN Scientific Publishing House 1993.
	Supplementary literature	1. Mechatronics. Analysis, design and testing of selected elements and systems. (Ed. K. Kluszczyński). Warsaw: Wydawnictwo PAK 2013. 2. Skoczyński W.: Sensors in CNC machine tools. Warsaw: Wydawnictwo Naukowe PWN S.A. 2018. 3. Grzegożek W., Adamiec-Wójcik I., Wojciech S.: Computer modeling of automotive vehicle dynamics. Krakow: Tadeusz Kościuszko University of Technology, Krakow 2003.
	eResources addresses	Adresy na platformie eNauczanie: Modelowanie układów mechatronicznych, W, Nano, Ist, sem. 06, lato, 2024/25, (PG_00052095) - Moodle ID: 45520 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=45520
Example issues/ example questions/ tasks being completed		1. Mechanical vibrations. Natural vibrations with the mass of the spring element taken into account. 2. Vibrations forced by a rotating unbalanced mass. 3. Elimination of mechanical vibrations. General description. 4. Modal control at energy performance index in a reduced system. 5. Modeling of the robot carrying system. Modeling of the response.
Work placement	Not applicable	

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