GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	, PG_00052095		
Field of study	Nanotechnology		
Date of commencement of studies	October 2021	Academic year of realisation of subject	2023/2024
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 hab. inż. Marek Galewski 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 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

Basic concepts. Creating computational models: Models of mechatronic system elements. Analogies between physical environments. Equations of dynamics in generalized coordinates. Vibrations mechanical: Free vibrations of systems with 1 degree of freedom. Forced vibrations of 1 degree systems freedom. Free and forced vibrations of systems with 2 degrees of freedom. Finite number systems degrees of freedom: Modeling of multi-mass systems. Structural models. Modal models. Basics automation: Operator transfer. Static characteristics. Control of mechatronic systems: Multidimensional control systems. Optimal linear control. Modal control. Layouts with feedback. Designing control systems. System modeling examples Mechatronics: Industrial Robot. Selected issues of vehicle dynamics.

Prerequisites and co-requisites

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	50.0%	33.33%

Recommended reading	Basic literature	1. Heimann B., Gerth W., Popp K.: Mechatronics. Components of the method examples. Warsaw: Scie. Publ. PWN 2001. 2. Gawrysiak M.: Mechatronics and mechatronic design. Bialystok: Publ. of Białystok UT 1997. (available at internet) 3. Cannon R. H.: Dynamics of physical systems. Warsaw: WNT 1973. 4. Kaliński K. J.: Supervision of dynamic processes in mechanical systems. Gdańsk: Publishing House of Gdańsk University of Technology 2012. 5. Kruszewski J., Wittbrodt E.: Vibrations of mechanical systems in computer terms. Volume I. Linear Problems. Warsaw: WNT 1995. 6. Kaczorek T.: Theory of control and systems. Warsaw: Scie. Publ. PWN 1993.
	Supplementary literature	1. Mechatronics. Analysis, design and testing of selected elements and systems. (Ed. K. Kluszczyński). Warsaw: PAK Publishing House 2013. 2. Skoczyński W.: Sensors in CNC machine tools. Warsaw: Scientific Publishing House PWN S.A. 2018. 3. Grzegożek W., Adamiec-Wójcik I., Wojciech S.: Computer modeling of vehicle dynamics. Cracow: Cracow University of Technology named T. Kosciuszko 2003
	eResources addresses	Adresy na platformie eNauczanie: Modelowanie układów mechatronicznych,W,NANO,Ist,sem.06,lato, 2023/24 (PG_00052095) - Moodle ID: 38395 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=38395
Example issues/ example questions/ tasks being completed	1. Elements of mechatronic systems storing potential energy 2. Vibrations excited by the force harmonic signal 3. Modeling of multibody systems. Eigenvibrations of systems with a finite number of degrees of freedom 4. Multidimensional control systems. Optimal linear control 5. Modeling of closed loop systems . Schematic diagram and block diagram 6. Modeling of the robot's carrying system. Modal control	
Work placement	Not applicable	