



Subject card

Subject name and code	, PG_00050052						
Field of study	Space and Satellite Technologies, Space and Satellite Technologies						
Date of commencement of studies	February 2023		Academic year of realisation of subject		2023/2024		
Education level	second-cycle studies		Subject group		Obligatory subject group in the field of study 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	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 Mechanics and Mechatronics -> Faculty of Mechanical Engineering and Ship Technology						
Name and surname of lecturer (lecturers)	Subject supervisor		dr inż. Michał Mazur				
	Teachers						
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	30.0	0.0	0.0	0.0	60
	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	60		10.0		30.0	100
Subject objectives	Overview of issues related to mechanical vibrations with particular emphasis on the subject of space structures.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[K7_W01] has extended knowledge of selected areas of mathematics making it possible to solve computational problems and develop research results of technical tasks.		The student can formulate and solve equations of motion for vibrating systems. The student can determine the shapes and frequencies of natural vibrations by solving eigenvalues problem.		[SW1] Assessment of factual knowledge		
	K7_U08		Has knowledge of identification methods and their application.		[SU4] Assessment of ability to use methods and tools [SU2] Assessment of ability to analyse information		
	[K7_K03] Can analyse and implement assigned tasks while maintaining high technical standards. Is able to work and interact in a group, taking on different roles. Adheres to the principles of professional ethics and respects the diversity of views and cultures.		Is able to realize team projects.		[SK1] Assessment of group work skills		
Subject contents	1. Vibrations of systems with one degree of freedom 2. Vibrations of systems with two degrees of freedom 3. Vibroisolation 4. Vibrations of systems with many degrees of freedom 5. Basics of Modal Analysis 6. Experimental Modal Analysis						
Prerequisites and co-requisites	Mathematics, Physics, Mechanics						
Assessment methods and criteria	Subject passing criteria		Passing threshold		Percentage of the final grade		
	Midterm colloquium		50.0%		40.0%		
	Written exam		50.0%		60.0%		

Recommended reading	Basic literature	<ul style="list-style-type: none"> Kaliński K.: Nadzorowanie procesów dynamicznych w układach mechanicznych. Wydawnictwo PG, Gdańsk 2012 Gawronski W.K.: Advanced Structural Dynamics and Active Control of Structures. Springer, 1998.
	Supplementary literature	<ul style="list-style-type: none"> Kaliński K.: Nadzorowanie procesów dynamicznych w układach mechanicznych. Wydawnictwo PG, Gdańsk 2012 Gawronski W.K.: Advanced Structural Dynamics and Active Control of Structures. Springer, 1998.
	eResources addresses	Adresy na platformie eNauczanie:
Example issues/ example questions/ tasks being completed	<p>1. Discuss the ERA method 2. Residua - what is it? Physical interpretation? 3. Upper and lower residua. For what? Physical interpretation 4. Time windows. Examples? For what? 5. Estimator H16. Estimator H27. Spectrum leak 8. OMA: Pros, Cons, Inputs. 9. FBS 10. CMS 11. MAC Disadvantages? Advantages? What counts and what does not count? 12. xMIF functions - discuss why? 13. What is a signal? Division. 14. Assumptions of Modal Analysis 15. Methods of scaling the mode of natural vibrations 16. Aliasing when sampling signals - what is it? how to counteract? 17. How can we check if the measurements were taken correctly? 18. How can we check that the identification is correct? 19. Discuss the stages of identification 20. Vibration eliminator 21. Vibroisolation 22. What is the difference between free vibrations from vibrations forced by a harmonic signal? 23. Resonance characteristics 24. Frequency of the oscillating system 25. The frequency of free damped vibrations 26. Critical damping</p>	
Work placement	Not applicable	