



Subject card

Subject name and code	, PG_00065914						
Field of study	Civil Engineering						
Date of commencement of studies	October 2022		Academic year of realisation of subject		2024/2025		
Education level	first-cycle studies		Subject group				
Mode of study	Part-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	Department of Mechanics of Materials and Structures -> Faculty of Civil and Environmental Engineering						
Name and surname of lecturer (lecturers)	Subject supervisor		dr inż. Marek Jasina				
	Teachers						
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	10.0	10.0	5.0	0.0	0.0	25
	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	25		0.0		0.0	25
Subject objectives	Solving structural dynamics problems using discrete models with single and n degrees of degrees of freedom.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[K6_U01] Apply knowledge and understanding of mathematics as well as sciences and engineering disciplines underlying civil engineering to solve engineering problems and issues.		The student uses knowledge of mathematics, physics, structural statics and strength of materials to solve problems in structural dynamics, including solving computational tasks		[SU1] Assessment of task fulfilment [SU4] Assessment of ability to use methods and tools		
	[K6_U05] Conducts research (obtaining information, simulations, experimental methods) in the field of construction in order to solve specific tasks and report research results.		The student solves tasks and design issues. The student prepares a report on the calculations made. The student carries out experiments and analyses the results. Student prepares a report of vibration measurements.		[SU4] Assessment of ability to use methods and tools [SU1] Assessment of task fulfilment [SU2] Assessment of ability to analyse information		
	[K6_W05] Demonstrate knowledge and understanding of research methods (obtaining information, simulations, experimental methods) in the field of civil engineering.		The student creates a dynamic model of plane frame and lattice systems. Determines the stiffness and compliance matrix of the system. Determines natural frequencies of frame and truss structures.		[SW3] Assessment of knowledge contained in written work and projects [SW1] Assessment of factual knowledge		
	[K6_W01] Demonstrate knowledge and understanding of mathematics as well as sciences and engineering disciplines underlying civil engineering at a level necessary to achieve the other programme outcomes.		The student has knowledge of structural statics and strength of materials, describes the behaviour of structures under external dynamic loads and analyses the dynamic response of linear systems.		[SW1] Assessment of factual knowledge [SW3] Assessment of knowledge contained in written work and projects		

Subject contents	Modelling of engineering structures. Forces acting on structures. Derivation of equations of motion. Free vibration of systems with one degree of freedom. Forced vibrations of systems with one degree of freedom (harmonic forcing, periodic forcing). Forced oscillations of systems with one degree of freedom (impulse forcing and any function) as a function of time). Free vibration of discrete systems with n degrees of freedom. Forced vibration of discrete systems with n degrees of freedom. Measurement and vibration reduction in engineering structures.		
Prerequisites and co-requisites	Completion of the course Mathematics, Mechanics of Structures, Experimental Methods in Strength of Materials.		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	test	40.0%	100.0%
Recommended reading	Basic literature	Rucka M., Wilde K.: <i>Dynamika Budowli z przykładami w środowisku MATLAB®</i>. Wydawnictwo Politechniki Gdańskiej, Gdańsk 2014. Rucka M., Burzyński S., Sabik A.: <i>Macierzowa analiza konstrukcji prętowych w środowisku MATLAB®</i>. Wydawnictwo Politechniki Gdańskiej, Gdańsk 2018. Chmielewski T., Zembaty Z.: <i>Podstawy dynamiki budowli</i>. Arkady, 1998. Lewandowski R.: <i>Dynamika konstrukcji budowlanych</i>. Wydawnictwo Politechniki Poznańskiej 2006. Guminiak M., Rakowski J.: <i>Mechanika konstrukcji prętowych w ujęciu macierzowym</i>. Wydawnictwo Politechniki Poznańskiej, 2012. Branicki C., Wismur M.: <i>Metody macierzowe w mechanice budowli i dynamika budowli</i>. Wydawnictwo Politechniki Gdańskiej. Gdańsk 1980. Chopra A.K.: <i>Dynamics of structures</i>. Upper Saddle River, New Jersey: Prentice Hall 2001.	
	Supplementary literature	Clough R.W., Penzien J.: <i>Dynamics of structures</i>. McGraw-Hill Inc. 1993. Kucharski T.: <i>Systemy pomiarów drgań mechanicznych</i>. Wydawnictwa Naukowo-Techniczne Warszawa 2002. Śliwiński A.: <i>Ultradźwięki i ich zastosowania</i>. Wydawnictwa Naukowo-Techniczne Warszawa 2001.	
	eResources addresses	Adresy na platformie eNauczanie:	

Example issues/ example questions/ tasks being completed	Calculate the natural frequency of a frame system with one dynamic degree of freedom. Determine the period of damped oscillation number from the recorded free vibration waveform. Determine the frequencies and natural frequencies of a frame system with n-dynamic degrees of freedom.
Work placement	Not applicable

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