



## Subject card

Subject name and code	, PG_00043301						
Field of study	Coastal and Offshore Engineering, Coastal and Offshore Engineering						
Date of commencement of studies	February 2022	Academic year of realisation of subject				2022/2023	
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				3.0	
Learning profile	general academic profile	Assessment form				assessment	
Conducting unit	Katedra Wytrzymałości Materiałów -> Faculty of Civil and Environmental Engineering						
Name and surname of lecturer (lecturers)	Subject supervisor	prof. dr hab. inż. Magdalena Rucka					
	Teachers	dr inż. Erwin Wojtczak dr inż. Marek Jasina prof. dr hab. inż. Magdalena Rucka					
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	15.0	0.0	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		25.0	75
Subject objectives	Student gains the basic knowledge about diagnosis and strengthening of hydrotechnical and power structures.						
Learning outcomes	Course outcome	Subject outcome				Method of verification	
	K7_U06	Student can perform basic diagnostics of elements of civil engineering structures using GPR method, ultrasonic methods and vibration-based methods. Student can analyse and interpret results of surveys.				[SU4] Assessment of ability to use methods and tools [SU2] Assessment of ability to analyse information [SU1] Assessment of task fulfilment	
	K7_W08	Student can describe a type of the given engineering structure and can select the diagnostic method that can be used for condition assessment of steel and concrete structural elements. Student can select a method of repair or strengthening.				[SW1] Assessment of factual knowledge	
	K7_K03	Student can communicate with other students to distribute the tasks to work out the final presentation on the given topic related to damage, diagnostics or strengthening of an engineering structure.				[SK1] Assessment of group work skills [SK4] Assessment of communication skills, including language correctness [SK3] Assessment of ability to organize work	

Subject contents	<p>Lecture:</p> <p>Damage of structures. Methods of diagnostics for civil engineering structures. Diagnostics based on vibrations. Experimental modal analysis. Diagnostics with the use of ground penetration radar method. Diagnostics of concrete and steel elements with the use of ultrasonic waves. Structure health monitoring systems for civil engineering objects. Hydrotechnical and power structures: durability, damage, failures. Legal aspects of monitoring hydrotechnical facilities. Monitoring systems for hydrotechnical and power facilities. Methods of strengthening and repairing hydrotechnical and power structures.</p> <p>Tutorials:</p> <p>Diagnostic tests using ground penetration radar method. Diagnostic tests using vibrations. Diagnostic tests of concrete structures using ultrasonic waves. using vibrations. Diagnostic tests of steel structures using ultrasonic waves. Strengthening of engineering structures.</p>											
Prerequisites and co-requisites	<p>Courses: Engineering Mechanic, Strength of Materials, Structural Analysis, Structural Dynamics and Computational Methods should be completed.</p>											
Assessment methods and criteria	<table border="1" data-bbox="448 920 1497 1055"> <thead> <tr> <th data-bbox="448 920 794 958">Subject passing criteria</th> <th data-bbox="794 920 1141 958">Passing threshold</th> <th data-bbox="1141 920 1497 958">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="448 958 794 1016">presentation about diagnostics of engineering structures</td> <td data-bbox="794 958 1141 1016">60.0%</td> <td data-bbox="1141 958 1497 1016">20.0%</td> </tr> <tr> <td data-bbox="448 1016 794 1055">report from laboratory tests</td> <td data-bbox="794 1016 1141 1055">60.0%</td> <td data-bbox="1141 1016 1497 1055">80.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	presentation about diagnostics of engineering structures	60.0%	20.0%	report from laboratory tests	60.0%	80.0%
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report from laboratory tests	60.0%	80.0%										
Recommended reading	<p>Basic literature</p>	<ol style="list-style-type: none"> <li>1. Bień J.: Uszkodzenia i diagnostyka obiektów mostowych. Wydawnictwa Komunikacji i Łączności, Warszawa, 2010.</li> <li>2. Drobiec Ł., Jasiński R., Piekarczyk A.: Diagnostyka konstrukcji żelbetowych. Metodologia, badania polowe. Badania laboratoryjne betonu i stali. Wydawnictwo Naukowe PWN, Warszawa, 2010.</li> <li>3. Kłedyński Z.: Remonty budowli wodnych. Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa, 2006.</li> <li>4. Masłowski E., Spiżewska D.: Wzmacnianie konstrukcji budowlanych. Arkady, Warszawa, 2000.</li> <li>5. Rucka M.: Wave Propagation in Structures. Modelling, Experimental Studies and Application to Damage Detection. Wydawnictwo Politechniki Gdańskiej, 2011</li> <li>6. Rucka M., Wilde K.: Dynamika Budowli z przykładami w środowisku Matlab®. Wydawnictwo Politechniki Gdańskiej, Gdańsk 2008.</li> <li>7. Runkiewicz L.: Wzmacnianie konstrukcji żelbetowych. Poradnik. Instytut Techniki Budowlanej, Warszawa, 2011.</li> <li>8. Śliwiński A.: Ultradźwięki i ich zastosowania. Wydawnictwa Naukowo-Techniczne Warszawa 2001.</li> </ol>										
	<p>Supplementary literature</p>	<ol style="list-style-type: none"> <li>1. Artykuły z czasopism specjalistycznych dotyczące diagnostyki i wzmacniania konstrukcji inżynierskich.</li> <li>2. Kucharski T.: Systemy pomiarów drgań mechanicznych. Wydawnictwa Naukowo-Techniczne Warszawa 2002.</li> <li>3. Rucka M., Wilde K.: Application of Wavelet Analysis in Damage Detection and Localization. Wydawnictwo Politechniki Gdańskiej, 2007.</li> <li>4. Zybura A., Jaśniok M., Jaśniok T.: Diagnostyka konstrukcji żelbetowych. Badania korozji zbrojenia i właściwości ochronnych betonu. Wydawnictwo Naukowe PWN, Warszawa, 2011.</li> </ol>										
	<p>eResources addresses</p>											
Example issues/ example questions/ tasks being completed												
Work placement	<p>Not applicable</p>											