



## Subject card

Subject name and code	, PG_00046179						
Field of study	Coastal and Offshore Engineering, Coastal and Offshore Engineering						
Date of commencement of studies	February 2022	Academic year of realisation of subject			2021/2022		
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	1	ECTS credits			4.0		
Learning profile	general academic profile	Assessment form			assessment		
Conducting unit	Department of Railway Engineering -> Faculty of Civil and Environmental Engineering						
Name and surname of lecturer (lecturers)	Subject supervisor	prof. dr hab. inż. Eligiusz Mieloszyk					
	Teachers	prof. dr hab. inż. Eligiusz Mieloszyk dr Anita Milewska					
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	30.0	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	10.0	45.0	100		
Subject objectives	The use of specialized mathematical tools to technical subjects, presentation of numerical problems.						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	K7_W01	The student has an extended and deepened knowledge of selected areas of mathematics, which are used to formulate, solve and verify complex problems of coastal and offshore engineering. He knows numerical methods of solving selected technical problems and is aware of the practical importance of convergence and stability of these methods.			[SW1] Assessment of factual knowledge		
	K7_U05	The student is able to use an extended mathematical apparatus to describe complex measurement processes. He can solve selected technical problems using numerical methods and is aware of the practical importance of convergence and stability of these methods. He can plan and carry out research experiments in selected issues related to coastal and offshore engineering in terms of mathematical description of the obtained results of active and passive experiments. He consciously chooses the appropriate method of problem description and solution.			[SU4] Assessment of ability to use methods and tools [SU3] Assessment of ability to use knowledge gained from the subject [SU2] Assessment of ability to analyse information [SU1] Assessment of task fulfilment		
	K7_K01	The student knows that all decisions and arguments must have their substantive justification. At each stage of the proceedings, he knows that he should answer the question: Why?			[SK5] Assessment of ability to solve problems that arise in practice [SK4] Assessment of communication skills, including language correctness		

Subject contents	<p>Signals and their technical examples and applications. Classification of signals taking into account continuous and discrete signals. Basic signals used in practice. Transition from continuous description to discrete description. Signal parameters. Scalar product in the signal space. Comparing signals.</p> <p>Orthogonal sequences and series. Fourier series. Fourier trigonometric series. Dirichlet conditions. Trigonometric Fourier series for even and odd functions. Signal decomposition using Fourier series.</p> <p>Partial differential equations and their applications, including sea dynamics and methods of solving them.</p> <p>Operator methods. Laplace and Fourier transform. Basic properties of the mentioned transforms. Convolution of functions and its meaning. Borel theorem. Application of operator methods in signal analysis.</p> <p>Fundamentals of the theory of reliability. Basic functions of reliability theory and their applications.</p> <p>Numerical methods in relation to selected engineering problems of approximate calculations. Convergence, stability of the discussed methods. Good and bad conditioning of the problem. Method error, its meaning and estimation.</p>		
Prerequisites and co-requisites	Fundamentals of mathematical analysis, differential and integral calculus, ordinary differential equations, probability and mathematical statistics. Basis for monitoring the technical condition of the structure and its use to assess its service life.		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
Recommended reading	Basic literature	<p>D. Bobrowski: Modele i metody matematyczne teorii niezawodności. PWN.</p> <p>E. Fidelis i inn.: Matematyczne podstawy oceny niezawodności. WNT.</p> <p>Z. Fortuna i in.: Metody numeryczne. PWN.</p> <p>L. Gajek, M. Kałuszka: Wnioskowanie statystyczne. WNT.</p> <p>J. Klamka, Z. Ogonowski: Metody numeryczne. Wyd. Politechniki Śląskiej.</p> <p>E. Mieloszyk: Nielasyczny rachunek operatorów w zastosowaniu do uogólnionych układów dynamicznych. Wyd. PAN.</p> <p>J. W. Owskiński: Wykład z metod analizy danych. Wyd. WSIS i Z.</p> <p>J. Sobkowski: Częstotliwościowa analiza sygnałów. WNT.</p> <p>T. P. Zieliński: Cyfrowe przetwarzanie sygnałów. WKŁ.</p>	

	Supplementary literature	<p>K. Worden i inn.: The fundamental axioms of structural health monitoring. Philosophical Transactions of the Royal Society: Mathematical, Physical and Engineering Sciences , 463 (2007), 1639 1664.</p> <p>Strategic Overview of Safety Levels in Offshore Engineering Structures. Offshore Technology Report OTO 97002, Rozdział III, 1998.</p> <p>A. Marsz, A. Styszyńska: Przegląd obciążeń środowiskowych konstrukcji morskich i wstępna ocena ich niektórych statystyk w warunkach Morza Bałtyckiego. Raport AM, Gdynia 2010.</p> <p>H. Sohni i inn. A Wavefield Imaging Technique for Delamination Detection in Composite Structures. Proc. of the Fifth European Workshop on Structural Health Monitoring (2010), 1335 1340.</p> <p>P. Nowak i in.: Komputerowe metody statystyki matematycznej. Wyd. WSIS i Z.</p>
	eResources addresses	
Example issues/ example questions/ tasks being completed	<p>Determine the Fourier series for a given signal.</p> <p>Definition of the Laplace transform.</p> <p>Define the basic signals.</p>	
Work placement	Not applicable	