



Subject card

Subject name and code	Diagnostics and Repair of Devices, PG_00045115						
Field of study	Ocean Engineering, Ocean Engineering						
Date of commencement of studies	October 2020	Academic year of realisation of subject			2022/2023		
Education level	first-cycle studies	Subject group					
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	Department of Ship and Land Based Power Plants -> Faculty of Ocean Engineering and Ship Technology						
Name and surname of lecturer (lecturers)	Subject supervisor	prof. dr hab. inż. Zbigniew Korczewski					
	Teachers	prof. dr hab. inż. Zbigniew Korczewski dr inż. Jacek Rudnicki mgr inż. Dominik Kreft					
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	30.0	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	Teach the theoretical foundations of technical diagnostics, general theory of exploitation and technology of repair of marine systems and equipment.						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	[K6_W06] has an organized knowledge on engineering methods and design tools allowing the conducting of projects within the construction and operation of ocean technology objects and systems	Student knows the basic notions of technical diagnostics. He knows the criteria for assessing the technical condition of the machine. Student is able to describe the elements of the diagnostic system of machines or energy systems, measures and methods of diagnostic operation.			[SW1] Assessment of factual knowledge [SW3] Assessment of knowledge contained in written work and projects		
	[K6_U05] can formulate a simple engineering task and its specification within the range of design, construction and operation of ocean technology objects and systems	Student is able to carry out a diagnostic test of the Diesel engine and assess the condition of its components based on the results of control parameters' measurement. Student is able to carry out a diagnostic test of a simple drive system by means of vibration and acoustic emission method.			[SU1] Assessment of task fulfilment [SU4] Assessment of ability to use methods and tools		
	[K6_W05] has an organized knowledge on design, construction and operation of ocean technology objects and systems	Student knows the basic assumptions, criteria and principles of the implementation of basic strategies for the operation of marine energy systems.			[SW1] Assessment of factual knowledge [SW3] Assessment of knowledge contained in written work and projects		

Subject contents	<p>Lecture: Basic notions and definitions: the concept of technical diagnostics, the notion of diagnosis and its reliability and accuracy, the notion of a diagnostic, diagnosed and diagnosing system, input and output signals and disturbances. The essence of technical diagnostics and its purpose and tasks. Forms of diagnostic activity: diagnosing, forecasting and genesis. Machine and energy system as an object of diagnosis. Diagnostic models of machines and energy systems: purposes of creating models, types of diagnostic models, principles of creating diagnostic models, practical usefulness of diagnostic models. Diagnostic methods and types of diagnostic inference about the technical condition of machines and energy systems. Diagnostic systems for the selected machines (high power engines) and energy devices and their reliability. Classification supervision of the operation of ship systems. Basic stages of overhaul of a technical device - general technological operations during the repair of a marine power plant. Verification of the technical condition and selected issues from the technology of repairs of basic elements of the ship, main propulsion system. Laboratory: Identification of the technical condition of the piston-cylinder and injection system of a compression-ignition engine by indicating its cylinders. Identification of the technical condition of a simple drive system using the vibration method and acoustic emission. Diagnostic examination of elements of the engine injection equipment on a test stand. Diagnostic examination of the valve timing unit of the Diesel engine on a laboratory test bed. Identification of the operational suitability of the lubricating oil by testing its viscosity. Diagnostic examination of the Diesel engine by means of the thermal imaging method (infrared camera). Determination of the chemical composition of engine exhaust gases. Verification of the technical condition of selected elements and systems of a diesel engine with the use of stereometric measurements. Static engine regulation.</p>											
Prerequisites and co-requisites	Knowledge of the subject internal combustion engines. Knowledge of subjects related to the basics of the operation of energy machines and devices.											
Assessment methods and criteria	<table border="1"> <thead> <tr> <th data-bbox="459 636 794 658">Subject passing criteria</th> <th data-bbox="802 636 1137 658">Passing threshold</th> <th data-bbox="1145 636 1481 658">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="459 669 794 714">Reports from the performed laboratory</td> <td data-bbox="802 669 1137 714">100.0%</td> <td data-bbox="1145 669 1481 714">25.0%</td> </tr> <tr> <td data-bbox="459 725 794 748">Test</td> <td data-bbox="802 725 1137 748">50.0%</td> <td data-bbox="1145 725 1481 748">75.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	Reports from the performed laboratory	100.0%	25.0%	Test	50.0%	75.0%
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Test	50.0%	75.0%										

Recommended reading	Basic literature	<p>L. Bendkowski: Elementy diagnostyki technicznej, WAT, Warszawa 1992 rok.</p> <p>J. Biernat, J. Girtler: Techniczna eksploatacja okrętów, WSMW, Gdynia 1983 rok.</p> <p>H. Czichos: Handbook of Technical Diagnostics: Fundamentals and Application to Structures and Systems. Springer Science & Business Media. 2013.</p> <p>M. Hebda: Teoria eksploatacji pojazdów, WKiŁ, Warszawa 1978 rok.</p> <p>Hardin J.R. i in. A gas turbine condition-monitoring system. Naval Engineers Journal, November 1995.</p> <p>J. Konieczny: Wstęp do teorii eksploatacji urządzeń, WNT, Warszawa 1971 rok.</p> <p>Z. Korczewski: Diagnostyka eksploatacyjna okrętowych silników spalinowych- tłokowych i turbinowych. Wybrane zagadnienia. Wydawnictwo PG, Gdańsk 2017.</p> <p>Kowalski A., Zaczek Z. Technologia remontu siłowni okrętowych, Wydawnictwo Morskie Gdańsk 1973.</p> <p>M. Mazur: Terminologia techniczna, WNT, Warszawa 1961.</p> <p>Nagawiecki J. Technologia napraw silników wysokoprężnych, Wydawnictwo Morskie Gdańsk 1976.</p> <p>S. Niziński: Eksploatacja obiektów technicznych, Biblioteka problemów eksploatacji, Radom 2002 rok.</p> <p>S. Niziński, H. Pelc: Diagnostyka urządzeń technicznych, WNT, Warszawa 1980 rok.</p> <p>Piaseczny L. Technologia naprawy okrętowych silników spalinowych, Wydawnictwo Morskie Gdańsk 1992.</p> <p>Ramsey David: The different types of industrial wear and tear. UK, 2016.</p> <p>L. Sitnik: Kinytika zużycia, Wydawnictwo Naukowe PWN, Warszawa 1998 rok.</p> <p>Włodarski J.K. Tłokowe silniki spalinowe procesy trybologiczne, WKiŁ Warszawa 1982.</p> <p>J.K. Włodarski: Podstawy eksploatacji maszyn okrętowych, Akademia Morska, Gdynia 2006 rok.</p> <p>B. Żółtowski: Leksykon diagnostyki technicznej, ATR Bydgoszcz 1996 rok.</p> <p>Polski Rejestr Statków Zasady działalności nadzorczej, PRS Gdańsk 2020.</p>
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	Supplementary literature	not applicable
	eResources addresses	<p>Adresy na platformie eNauczanie:</p> <p>Diagnostyka i remonty urządzeń, W, sem.06, letni 22/23 (PG_00045115) - Moodle ID: 25409 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=25409</p>
Example issues/ example questions/ tasks being completed	<p>Decomposition of the research object for the needs of diagnostics.</p> <p>Diagnostic criteria.</p> <p>Methodology of indicating the Diesel engine.</p> <p>Ship power plants maintenance system based on classification requirements.</p> <p>Methods of cylinder bearing surface regeneration.</p> <p>Basic stages of the service of a technical device.</p>	
Work placement	Not applicable	