GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Technical Diagnostics (WOiO), PG_00042088						
Field of study	Power Engineering						
Date of commencement of studies	October 2024		Academic year of realisation of subject	2026/2027			
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	English			
Semester of study	6		ECTS credits	4.0			
Learning profile	general academic profile		Assessment form	assessment			
Conducting unit	Division of Marine Power Plants -> Institute of Naval Architecture -> Faculty of Mechanical Engineering and Ship Technology -> Faculties of Gdańsk University of Technology						
Name and surname of lecturer (lecturers)	Subject supervisor		prof. dr hab. inż. Zbigniew Korczewski				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	0.0	0.0	15.0	30
	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	30		5.0	65.0	100	
Subject objectives	To teach theoretical basis of technical diagnostics of energy machines and devices, as well as to explain the methods and means of diagnostic action. To make familiar with selected diagnostic systems for high power engines and working machines of complex energy systems.						

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_W13] has basic knowledge of the operation of energy equipment in the field of thermal power plants, thermal and energy and heating systems, internal combustion engines, compressors and rotating machines, has basic knowledge of the regulation of energy equipment and methods of their selection depending on the needs	Student is able to describe the elements of the diagnostic system of machines or energy systems, as well as methods and means of the operation diagnostics.	[SW1] Assessment of factual knowledge
[K6_W12] has basic knowledge of the life cycle and repairs of energy equipment in the field of thermal power stations, thermal and energy systems and heating systems, internal combustion engines and compressors as well as rotating machines	Student knows and understands the notions: of physics of operational damege, demageability and durability of a technical object. He knows primary causes of known and recognizable damages for engines and working machines of complex energy systems.	[SW1] Assessment of factual knowledge
[K6_W06] knows classic and developmental energy technologies, rules for the selection and operation of heat and energy devices and installations, basic principles of energy systems operation, basic issues regarding the reliability of energy devices and diagnostics, environmental effects of energy technologies used, methods of using renewable energy sources	Student knows basic notions of the technical diagnostics. He knows criteria for assessing a technical health of the machine.	[SW1] Assessment of factual knowledge
[K6_K04] is able to formulate opinions on technical and technological processes in energy and sanitary engineering	Student is able to identify a diagnostic system of the selected machine or the complex energy systems base on independent search for internet resources.	[SK2] Assessment of progress of work [SK5] Assessment of ability to solve problems that arise in practice

Subject contents

Course content – lecture

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.

Seminar: Failure rates and diagnostic systems for: high-power compression igntion engines, gas turbine engines, wind turbine sets, other machines and devices of complex energy systems - selected solutions.

Prerequisites and co-requisites

Knowledge within theoretical foundations of combustion engines: piston and turbine. Knowledge within the basic principles of machines and devices operation.

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
test	51.0%	75.0%
Seminar presentation	100.0%	25.0%

Recommended reading	Basic literature	A. Adamkiewicz, R. Michalski, W. Zeńczak: Wybrane problemy technologii konwersji energii w okrętowych systemach energetycznych. Wydawnictwo KARPRINT, Lublin 2012 rok. H. Czichos: Handbook of Technical Diagnostics: Fundamentals and Application to Structures and Systems. Springer Science & Business Media. 2013. P. Dempsey: Troublesooting and repairing Diesel engines. McGraw Hill. USA, 2008. Hardin J.R. i in. A gas turbine condition-monitoring system. Naval Engineers Journal, November 1995. Z. Korczewski: Endoskopia silników okrętowych. AMW Gdynia, 2008. Z. Korczewski: Diagnostyka eksploatacyjna okrętowych silników spalinowych- tłokowych i turbinowych. Wybrane zagadnienia. Wydawnictwo PG, Gdańsk 2017. Z. Korczewski: Identyfikacja procesów gazodynamicznych w zespole sprężarkowym okrętowego turbinowego silnika spalinowego dla potrzeb diagnostyki, AMW, Gdynia 1998 rok. Jerzy A. Krzyżanowski, Jerzy Głuch: Diagnostyka cieplno-przepływowa obiektów energetycznych, Wydawnictwo IMP PAN, Gdańsk 2004. J. Lewitowicz i inni: Podstawy eksploatacji statków powietrznych. Tom 1-7. Wydawnictwo Instytutu Technicznego Wojsk Lotniczych. Warszawa 2001-2009. A . Miller: Maszyny i Urządzenia cieplne i energetyczne. Wydawnictwa Szkolne i Pedagogiczne. Warszawa 1996 rok. S. Niziński: Eksploatacja obiektów technicznych, Biblioteka problemów eksploatacji, Radom 2002 rok. Ramsey David: The different types of industrial wear and tear. UK, 2016. S. Szczeciński i inni: Lotnicze silniki turbinowe. Konstrukcja, Eksploatacja, Diagnostyka. Część I i II. WKiŁ, Instytut Lotnictwa, Warszawa 2010 rok. S. Szczeciński i inni: Historia i perspektywy rozwoju napędów lotniczych. Biblioteka Naukowa Instytutu Lotnictwa, Warszawa 2005 rok.
	Supplementary literature	ISO 13372:2012 : Condition monitoring and diagnostics of machines Vocabulary.
	eResources addresses	
Example issues/ example questions/ tasks being completed	Decomposition of the research object for the needs of diagnostics. Diagnostic criteria. Methodology of indicating a high power Diesel engine.	
Practical activites within the subject	Not applicable	

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