GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	, PG_00056323		
Field of study	Ocean 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	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	Institute of Naval Architecture -> Faculty of Mechanical Engineering and Ship Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Jacek Rudnicki	
	Teachers	dr inż. Jacek Rudnicki	

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	50.0	100

Subject objectives

To teach systematic approach to problems of engine room piping systems. To familiarize with typical construction solutions and characteristics of the basic elements of the installation. To teach methods of calculations and selection of selected elements of piping systems.

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	Describes the course of action in the calculation and selection of major components of a combustion engine room installation. Identifies the marine equipment market for the supply of major components and accessories of marine piping systems.	[SW1] Assessment of factual knowledge
[K6_W05] has an organized knowledge on design, construction and operation of ocean technology objects and systems	Explains the general structure of of typical solutions of engine room installations systems with diesel engines. Indicates the determinants classification determinants influencing structure of the installation.	[SW1] Assessment of factual knowledge
[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	Draws block and schematic diagrams of the discussed installations. Calculates and selects main elements of the installation on the basis of technical documentation of engines and catalogs of factory ship devices.	[SU3] Assessment of ability to use knowledge gained from the subject [SU1] Assessment of task fulfilment

Subject contents

Lecture
Basic knowledge of engine room piping systems - functions, design conditions, classification requirements, diagrams, CAD-CAM support. Tasks, general structure and typical construction solutions of selected engine room piping systems: cooling, fuel, lubricating oil, exhaust gas, compressed air, heating steam. Principles of selection and calculation of basic elements of selected piping systems.
Auditorium exercises
Calculation of flow resistance in pipelines of selected power systems - selection of pumps. Calculation and selection of: heat exchangers, fuel and lubricating oil separators, starting air compressors. Calculation and selection of exhaust gas system components.

Prerequisites and co-requisites

Knowledge of the subject Internal combustion engines, Thermodynamics, Pumps and compressors, Boilers and heat exchangers.

Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Midterm colloquium - exercise	51.0%	30.0%
	Midterm colloquium - lecture	51.0%	70.0%
Recommended reading	Basic literature	PRS - Przepisy klasyfikacji i budowy statków morskich. Część VI, Urządzenia maszynowe i urządzenia chłodnicze - styczeń 2021. PRS - Przepisy klasyfikacji i budowy statków morskich.Część VII, Silniki, mechanizmy, kotły i zbiorniki ciśnieniowe - lipiec 2020. PRS publikacja przepisowa 53/P: Okrętowe rurociągi z tworzyw sztucznych - styczeń 2020 Giernalczyk M., Górski Z.: Siłownie okrętowe cz. II. Instalacje okrętowe. Akademia Morska w Gdyni. Gdynia 2016. Michalski R.: Siłownie okrętowe. Obliczenia wstępne oraz ogólne zasady doboru mechanizmów i urządzeń pomocniczych instalacji siłowni okrętowych. Skrypt PSzcz., Szczecin 1987. Urbański P.: Gospodarka energetyczna na statkach. Wyd. Morskie, Gdańsk 1978. Urbański P.: Instalacje spalinowych siłowni okrętowych. Skrypt PG, Gdańsk 1994. Wojnowski W.: Okrętowe siłownie spalinowe. Gdańsk, Część I 1991, cz. II 1992.	
	Supplementary literature	Shah Ramesh K., Sekulic Dusan P.: Fundamentals ff Heat Exchanger Design. John Wiley & Sons, Inc. New Jersey 2003. Karassik I. J., Messina J. P., Cooper P., Heald C.C.: Pump handbook. McGRAW-HILL New York 2001.	
	eResources addresses	Adresy na platformie eNauczanie: Instalacje siłowni okrętowej, W, C, SiUO, sem.06, letni 24/25 - Moodle ID: 43726 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=43726	

Example issues/ example questions/ tasks being completed	Lecture 1. Present the algorithm for the selection of the heavy fuel heater for low-speed main drive engines the necessary input data, calculation scheme, output values. 2. Draw and discuss the block diagram of the high temperature circuit (HT) of the cooling water of the low-speed engine cylinders, indicating how to incorporate the evaporator and preheat engine into this system (only the solution with connected HT and LT circuits). 3. Draw and discuss the schematic diagram of the fuel supply system (from the service tank) of the main drive Diesel engine operating with heavy fuel. 4. Draw and describe the flowchart of the continuous and periodic purification system of circulating oil explain the differences in the functioning of the systems. Auditorium exercises 1. If the max. permissible flow velocity of the cooling water in the pipeline is xx m/s and the required flow rate is yy m3h, the medium pressure is zz bar and its max. permissible temperature is vv oC, this means that the minimum internal diameter of the pipeline should be approx. . [mm]. 2. Calculate the heat transfer surface of a shell-and-tube cooler or alternatively a plate cooler in a freshwater system cooling the cylinders if the cooler is to dissipate heat Q = xx and the freshwater volume flows V1 = yy and central water V2 = zz are known. Consider parallel configuration of oil and cylinder water coolers and tropical design conditions.
Work placement	Not applicable

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