Subject card

Subject name and code	, PG_00056323					
Field of study	Ocean Engineering					
Date of commencement of studies	October 2021		Academic year of realisation of subject		2023/2024	
Education level	first-cycle studies		Subject group		Optional subject group 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	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 Ocean Engineering and Ship Technology -> 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_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.	[SU1] Assessment of task fulfilment [SU3] Assessment of ability to use knowledge gained from the subject
	[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_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

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 - lecture	51.0%	70.0%
	Midterm colloquium - exercise	51.0%	30.0%

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 23/24 (PG_00045111) - Moodle ID: 35375 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=35375

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