GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Design of ship propulsion systems using internal combustion engines, PG_00065633						
Field of study	Naval Architecture and Offshore Structures						
Date of commencement of studies	February 2025		Academic year of realisation of subject	2025/2026			
Education level	second-cycle studies		Subject group	Specialty 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	1		Language of instruction	English			
Semester of study	2		ECTS credits	5.0			
Learning profile	general academic profile		Assessment form	exam			
Conducting unit	Division of Marine Power Plants -> Institute of Naval Architecture -> Faculty of Mechanical Engineering and Ship Technology -> Wydziały Politechniki Gdańskiej						
Name and surname of lecturer (lecturers)	Subject supervisor		dr inż. Roman Liberacki				
	Teachers						
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	15.0	0.0	30.0	0.0	75
	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	75		12.0	38.0	125	
Subject objectives	Teaching students the principles of designing a ship's power plant with diesel and diesel-electric propulsion at the preliminary and advanced stages of ship project implementation.						

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_U04] creatively designs or modifies, either entirely or in part, a shipborne or offshore system or process according to a given specification, considering both technical and non-technical aspects, estimating costs and adopting design techniques representative for the field	The student is able to design ship systems while considering the requirements of classification societies, applicable conventions, and economic aspects.	[SU1] Assessment of task fulfilment
[K7_W01] explains and describes, based on general knowledge in the field of scientific disciplines forming the theoretical foundations of Naval Architecture and Ocean Engineering, the construction and principles of operation of marine systems, processes and their components, as well as methods and means of their design and operation	The student is able to explain the operating principles of engines, equipment, and pipeline system components installed on ships.	[SW1] Assessment of factual knowledge
[K7_U13] evaluates the feasibility and potential for utilizing new technical and technological achievements in accomplishing tasks characteristic for the field of study	The student is able to assess the applicability of new technical solutions used in the construction of ship power plants and identify the possibilities, advantages, and disadvantages of their implementation.	[SU2] Assessment of ability to analyse information
[K7_U01] applies acquired analytical, simulation, and experimental methods, as well as mathematical models for analysis and evaluation of shipborne and offshore systems and processes	The student applies appropriate computational algorithms and available tools in the form of calculation and graphic software during the implementation of the ship power plant project.	[SU4] Assessment of ability to use methods and tools
[K7_U02] formulates and tests hypotheses concerning problems related to shipborne and offshore systems/processes, as well as simple research problems	The student is able to formulate and verify statistical hypotheses regarding the distributions of the operational time of ship equipment and their expected values.	[SU1] Assessment of task fulfilment
[K7_W04] demonstrates knowledge encompassing selected issues in the field of advanced knowledge, particularly in the scope of methods, techniques, tools, and algorithms specific to Naval Architecture and Ocean Engineering	The student has detailed knowledge of computational methods and computer tools used in the design of marine diesel power plants.	[SW1] Assessment of factual knowledge

Subject contents

Lecture and Practical Classes: Methods for determining propulsion power for ships, electrical power demand, and heating steam consumption. Configuration of the ships propulsion system, shipboard power plant, and marine steam boilers. Selection criteria for main engines, diesel generator sets, and steam boilers. Power transmission in the propulsion system energy-related aspects. Selection of propulsion system components (gearboxes, couplings, bearings, shaft line segments). Design of auxiliary systems in the engine room, including (cooling systems, fuel supply systems,lubricating oil systems, starting air systems, exhaust gas systems, heating steam systems). Marine environmental protection equipment legal requirements and selection principles. Reliability aspects of shipboard machinery and systems.

Project Work: Compilation of a list of engine rooms of similar vessels. Analysis of potential energy system configurations for a ship. Selection of main engines, generator sets, boilers, and propulsion system components. Design of selected auxiliary systems in the engine room, including piping, fittings, and equipment. Selection of required environmental protection devices. Preparation of the engine room layout plan.

Prerequisites and co-requisites

Knowledge of subjects: internal combustion engines and marine ship power plants.

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Written exam	50.0%	50.0%
Project report	100.0%	50.0%

Recommended reading	Basic literature	1. MAN: Basic principles of ship propulsion (brochure) 2. Hans Klein Woud, Douwe Stapersma: Propulsion and Electric Power Generation systems. IMAREST 2002 3. Rules for the Classification and Construction of Sea-going Ships (MOR)
	Supplementary literature	Technical catalogues and engineering design guides provided by marine equipment manufacturers.
	eResources addresses	
Example issues/ example questions/ tasks being completed	1. Present the principles for selecting main engines, generator sets, and boilers. 2. Provide the formula for the energy efficiency of the engine room and discuss methods for improving efficiency. 3. Methods for selecting pumps, heat exchangers, filters, and fittings. 4. Execution of the assigned design task.	
Work placement	Not applicable	

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