GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	, PG_00056322		
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	6.0
Learning profile	general academic profile	Assessment form	exam
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		

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	30.0	15.0	15.0	0.0	0.0	60

E-learning hours included: 0.0

Address on the e-learning platform: https://enauczanie.pg.edu.pl/moodle/course/view.php?id=11673

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	80.0	150

Subject objectives

To teach the principles of selection and evaluation of the main components of ship's Diesel propulsion systems and methods of analysis of their cooperation. To acquaint with solutions of the Diesel - electric propulsion systems and development tendencies in the field of marine propulsion 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	Creates a list of similar vessels and calculates from it the values of energy indicators of the designed energy system. Applies knowledge of mathematical statistics to solve technical problems.	[SU4] Assessment of ability to use methods and tools [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	He calculates and draws characteristics of main ship power system upon general formulas. He explains rules of engine and propeller cooperation in different swimming conditions, based on appropriate graphs.	[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	Presents the characteristics and principles of selection of main propulsion engines and defines their evaluation indices. Explains the principles of selection of the basic elements of the ship's power system.	[SW1] Assessment of factual knowledge

Subject contents	LECTURE Classification and scope of application of different types of marine power plants. Power scheme and efficiency in main ship propulsion system, indexes of appraisal. Power transmission elements in a propulsion system - constructional solutions, selection principles. Marine propulsors - characteristics, selected issues concerning selection. Main propulsion engines - types, construction and energy indicators, characteristics, selection principles. Propulsion characteristics - engine and propeller cooperation in various sailing conditions. Combustion-electric propulsion systems. Developmental trends of marine propulsion systems. AUDITORIUM EXERCISES Development of a list of similar ships. Use of approximate formulas in propulsion system characteristics calculations. Realization of ship propulsion system propulsion characteristics. LABORATORY Preparation for operation, starting and supervision during operation of selected ship propulsion systems - simulator exercises.
Prerequisites and co-requisites	Knowledge of the subjects: Fundamentals of ship systems, Fundamentals of marine power plants

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Midterm colloquium - lecture	51.0%	70.0%
Practical skills - laboratory	100.0%	15.0%
Midterm colloquium - exercise	51.0%	15.0%

Recommended reading

Basic literature	1. Przepisy klasyfikacji i budowy statków morskich. PRS, Gdańsk 2018. 2. Balcerski A.: Siłownie okrętowe. Podstawy termodynamiki, silniki i napędy główne, urządzenia pomocnicze, instalacje. Skrypt PG, Gdańsk 1990. 3. Giernalczyk M., Górski Z.: Siłownie okrętowe. Cz. I, Gdynia 2011. 4. Taylor D.a.: Introduction to Marine Engineering. Elsevier Butterworth-Heinemann, Oxford 2003. 5. Urbański P.: Podstawy napędu statków, Gdańsk 2005. 6. Urbański P.: Gospodarka energetyczna na statkach. Wyd. Morskie, Gdańsk 1978. 7. Wojnowski W.: Okrętowe siłownie spalinowe. Gdańsk, Część I 1991, cz. II 1992. 8. Wyd. zb.: Poradnik okrętowca. Wyd. Morskie, Gdynia 1960. 9. K. Van Dokkum: Ship Knowledge: A Modern Encyclopedia, Dokmar 2013. 10. J. Babicz: WÄRTSILÄ ENCYCLOPEDIA OF SHIP TECHNOLOGY 2015
Supplementary literature	No
eResources addresses	Adresy na platformie eNauczanie:

Example issues/ example questions/ tasks being completed

LECTURE

1. 1. Present the towing characteristics of a tugboat propeller when designed for free floating conditions - give and justify the disadvantages (advantages) of such a solution.
2. Draw in the thrust-velocity coordinate system example waveforms of the thrust relationship as a function of ship speed for constant propeller speed, constant torque, and constant power delivered to the propeller.
3. State the difference between a rigid clutch and a flexible clutch, draw an example of the characteristics of a flexible clutch.
4. Sketch the shaft line vagina and list the components present (the main propulsion system is a slow speed Diesel engine and a fixed pitch propeller).
5. Outline the necessary input data and general workflow when selecting a gearbox for a marine propulsion system.

AUDITORY EXERCISES

1. The speed of the ship is xx knots. At this speed, the ship needs yy tons of fuel to reach port. What would the speed have to be if the fuel supply was zz tons ?
2. The single propeller powered vessel is powered by a supercharged diesel engine with nominal power Nx and nominal speed nx. The motor has failed and can only generates yy% of rated torque and zz% of rated speed due to allowable heat loads. Present the nominal operating points of the propulsion system before and

Work placement	Not applicable