



Subject card

Subject name and code	, PG_00056307						
Field of study	Ocean Engineering						
Date of commencement of studies	October 2021		Academic year of realisation of subject		2022/2023		
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	2		Language of instruction		Polish		
Semester of study	4		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	15.0	0.0	0.0	60
	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	60		10.0		30.0	100
Subject objectives	To teach the scope of applications, general construction, principles of work and selected issues concerning the operation of industrial piston engines used in water transport.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K6_W05] has an organized knowledge on design, construction and operation of ocean technology objects and systems	The student describes the characteristics of engines: speed, load, universal and control. Explains how to use waste heat of exhaust gas and cooling water. Describes the cooperation of engines and propeller on the basis of analysis of changes in characteristics of engines. Shows the heat balance of engines and determines the values of characteristic parameters of theoretical cycle as well as work and power, thermal efficiency and specific fuel consumption Translated with www.DeepL.com/Translator (free version)	[SW1] Assessment of factual knowledge
	[K6_U04] has self-education skills in order to improve professional qualifications, is ready to work in industrial environment, adheres to HSE rules and regulations	Student defines and explains correlations between indexes of engines' work and prepares engine performance characteristics	[SU3] Assessment of ability to use knowledge gained from the subject
	[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	Student explains principles of operation of supercharged and non-supercharged engines: four-stroke and two-stroke and their construction. He classifies and describes theoretical and real cycles of engines, parameters (indexes) of work of engines and makes measurements of these parameters.	[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	The student develops the basic characteristics of an engine - load system power, recognizes typical faults on the basis of engine operating parameters	[SU3] Assessment of ability to use knowledge gained from the subject
Subject contents	LECTURE Introduction to the course. General information on self-ignition internal combustion engines. Classification of internal combustion engines. Principle of operation of diesel engines. Theoretical cycles in diesel engines. Real cycles in diesel engines. Exchange process of working medium in two- and four-stroke engines. Indicators of diesel engine operation. Supercharging and its effect on engine operation. Characteristics of diesel engine. Heat balance of diesel engine. Utilization of waste heat of exhaust and cooling water. Interaction between piston engine - propeller - hull. Selected aspects of operation of marine internal combustion engines. Overall construction of diesel engine. AUDITORIUM CLASSES Solving tasks for calculating the characteristic points of theoretical cycles (Otto, Diesel and Sabathe) in unsupercharged and supercharged combustion engines, and tasks enabling the students to determine: work of cycles, engine power, theoretical mean pressure, thermal efficiency and fuel consumption per unit. LABORATORY CLASSES Preparations for starting engine, starting engine and control during operation. Effect of environmental conditions on parameters of engine operation. External, control and load characteristics. Regulation characteristics. Universal characteristics. Effect of defects on selected indicators of engine operation. Diagnosis of common failures on the basis of engine operation parameters.		
Prerequisites and co-requisites	Subject knowledge of Thermodynamics and Physics. Knowledge of making measurements of basic physical quantities		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Passing the classes	51.0%	20.0%
	Midterm colloquium	51.0%	50.0%
	Practical exercise	100.0%	30.0%
Recommended reading	Basic literature	1. Balcerski A.: Silownie okrętowe. Wyd. PG, Gdańsk 1990. 2. Piotrowski I.: Okrętowe silniki spalinowe. Zasady budowy i działania. WM, Gdańsk 1983. 3. Piotrowski I., Witkowski K.: Okrętowe silniki spalinowe. TRADEMAR, Gdynia 1996. 4. Włodarski J.K.: Okrętowe silniki spalinowe. Podstawy teoretyczne. Wyd. WSM (AMW), Gdynia 1996. 5. Włodarski J.K.: Okrętowe silniki spalinowe. Budowa. Wyd. WSM (AMW), Gdynia 1996. 6. Włodarski J.K.: Okrętowe silniki spalinowe. Konstrukcje specjalne. Wyd. WSM (AMW), Gdynia 1995.	
	Supplementary literature	1. Wajand J.A.: Silniki o zapłonie samoczynnym. WNT, Warszawa 1988. 2. Wajand J.A., Wajand J.T.: Tłokowe silniki spalinowe średnio- i szybkoobrotowe. WNT, Warszawa 1993. 3. Wajand J.A., Wajand J.T.: Tłokowe silniki spalinowe średnio- i szybkoobrotowe. WNT, Warszawa 1997. 4. Wajand J.A., Wajand J.T.: Tłokowe silniki spalinowe średnio- i szybkoobrotowe. WNT, Warszawa 2000. 5. Pudlik W., Grudziński D., Cieśliński J., Jasiński W.: Termodynamika zadania i przykłady obliczeniowe. Gdańsk 2008	

	eResources addresses	Adresy na platformie eNauczenie: Okrętowe silniki spalinowe tłokowe, W, C, L, sem.04, letni 22/23 (PG_00056307) - Moodle ID: 25407 https://enauczenie.pg.edu.pl/moodle/course/view.php?id=25407
Example issues/ example questions/ tasks being completed	<ol style="list-style-type: none"> 1. The sequence of the combustion process in a compression ignition engine and its influence on engine operation. 2. Supercharging of compression ignition engines and its influence on engine performance indices. 3. Forces and moments acting in the piston-crank system of the engine - sources, nature of changes, influence on the structure and work of the system, other effects. 4. General construction and principle of operation of two-stroke compression ignition piston engine. Basic indicators of engine operation. 5. Starting system of diesel engine - typical construction solutions. 	
Work placement	Not applicable	