



## Subject card

Subject name and code	, PG_00056314						
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	5	ECTS credits			4.0		
Learning profile	general academic profile	Assessment form			assessment		
Conducting unit	Faculty of Ocean Engineering and Ship Technology						
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	15.0	15.0	15.0	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 the basic processes and heat flow laws and to teach the structure and principles of the usage of boilers and heat exchangers used on ships.						
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	Student has knowledge about application of similarity theory in designing of heat exchangers			[SW1] Assessment of factual knowledge		
	[K6_W05] has an organized knowledge on design, construction and operation of ocean technology objects and systems	The student has knowledge of the construction and operation of the marine boilers and heat exchangers.			[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 is able to perform basic calculations in order to select a heat exchanger.			[SU1] Assessment of task fulfilment		
Subject contents	Basic processes and laws of heat flow: conduction, convection, radiation. Convection and overall heat transfer. Properties of materials used in heat exchangers. Conductors and heat isolators. Functioning of coolers, heaters, condensers and evaporators. Construction of heat exchangers: shell- and-tube, plate and others. Determination of heat exchangers surface. Operation of marine steam boilers: fuel fired and exhaust gas boilers. Heat exchange in boilers. Boilers construction. Work safety of boilers and heat exchangers.						
Prerequisites and co-requisites	Knowledge from Thermodynamics						
Assessment methods and criteria	Subject passing criteria		Passing threshold		Percentage of the final grade		
	Written test		50.0%		50.0%		
	Completion of laboratory tasks		100.0%		50.0%		

Recommended reading	Basic literature	Balcerski A.: Siłownie okrętowe. Skrypt PG 1990  Górski Z., Perepeczko A.: Okrętowe kotły parowe. Skrypt WSM Gdynia 2002  Górski Z., Perepeczko A.: Okrętowe maszyny i urządzenia pomocnicze. Wyd. TRADEMAR 1998
	Supplementary literature	Pudlik W.: Wymiana i wymienniki ciepła. Skrypt PG 1980  Szargut J.: termodynamika. WN PWN. Warszawa 2000
	eResources addresses	Adresy na platformie eNauczanie:
Example issues/ example questions/ tasks being completed	1. List and briefly describe heat transfer mechanisms.2. Write and explain the Peclet equation3. Explain the difference between fire tube and water tube boilers.4. Determine the heat transfer coefficient of the tested heat exchanger.	
Work placement	Not applicable	