

## GDAŃSK UNIVERSITY

## Subject card

	DO 00055000									
Subject name and code	, PG_00055306									
Field of study	Ocean Engineering									
Date of commencement of studies	October 2021		Academic year of realisation of subject			2021/2022				
Education level	first-cycle studies		Subject group			Obligatory subject group in the field of study				
Mode of study	Full-time studies		Mode of delivery			at the university				
Year of study	1		Language of instruction			Polish				
Semester of study	2		ECTS credits			3.0				
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 hab. inż. Damian Bocheński								
	Teachers		dr hab. inż. Damian Bocheński							
	dr inż. Patrycja Puzdrowska									
Lesson types and methods	Lesson type	Lecture	Tutorial	Laboratory	Projec	t	Seminar	SUM		
of instruction	Number of study hours	30.0	15.0	0.0	0.0		0.0	45		
	E-learning hours inclu	ided: 0.0								
	Adresy na platformie eNauczanie:									
	Termodynamika, W, OCE, sem. 2, lato 2021/22 - Moodle ID: 22568 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=22568									
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Learning activity and number of study hours	Learning activity Participation ir classes include plan		I didactic Participation in   ed in study consultation hours		Self-study SUM		SUM			
	Number of study hours	45		5.0		25.0		75		
Subject objectives	acquaint with the basic concepts of classical thermodynamics, laws of thermodynamics, properties of thermodynamic substances, energy and exergy balances for thermodynamic systems, ideal cycles of thermal machines, and explain the importance of lecture subjects in engineering practice									
Learning outcomes	Course outcome		Subject outcome			Method of verification				
	[K6_W03] has a basic knowledge on hydromechanics, thermodynamics, machine construction, ecology, materials science and electronics necessary to understand the construction and operation principles of ocean technology objects and equipment		Student knows the basic concepts of the terminology used in thermodynamics. It describes the properties of thermodynamic systems using zero and first and second laws of thermodynamics. Shows the energy metabolism in the system work and entropic systems. Specifies balances: mass, energy and exergy. Presents the ideal gas law and describes the properties of the energy of combustion engines, gym, steam, refrigeration and heat pumps with respect to their theoretical circuits. Analyzes the properties of the energy produced steam and describe the properties of solids and liquid, which are essential in engineering practice.			[SW1] Assessment of factual knowledge				
	range of the possessed job and knows the possibilities of further education		Student applies knowledge of thermodynamics to solve technical problems.			[SK5] Assessment of ability to solve problems that arise in practice				

Subject contents	LECTURE Introduction. Fundamentals of thermodynamics. The zeroth law of thermodynamics. The principle of conservation of amount of substances. The first law of thermodynamics. Energy balance. Equations of ideal, semi-ideal and real states. Entropy. Changes in ideal gases. The second law of thermodynamics. Theoretical cycles in internal combustion piston engines. Theoretical cycles in internal combustion turbine engines. Thermodynamics of steams. Theoretical cycles in steam power plant. Theoretical cooling cycles and heat pumps.						
Prerequisites and co-requisites	Subject knowledge of Physics, Fluid Mechanics, Mathematics						
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade				
	test	60.0%	100.0%				
Recommended reading	Basic literature	Pudlik W.: Termodynamika. Wyd. PG, Gdańsk 1995. 2. Szargut J.: Termodynamika. PWN, Warszawa 1980. 3. Szargut J.: Termodynamika techniczna. PWN, Warszawa 1991. 4. Szargut J.: Termodynamika techniczna. PWN, Warszawa 1988. 5. Wiśniewski S.: Termodynamika techniczna. WNT, Warszawa 1980. 6. Wiśniewski S.: Termodynamika techniczna. WNT, Warszawa 1999. 7. Wiśniewski S., Wiśniewski T.S.:: Wymiana ciepła. WNT, Warszawa 1994. 8. Pudlik W., Grudziński D., Cieśliński J., Jasiński, W.: Termodynamika zadania i przykłady obliczeniowe. Gdańsk 2008					
	Supplementary literature	Buchowski H, Ufnalski W.: Podstawy termodynamiki, WNT, Warszawa 1998. 2. Domański R., Jaworowski M., Redow M., Kołdyś J.: Wybrane zagadnienia z termodynamiki w ujęciu komputerowym. PWN, Warszawa 2000. 3. Staniszewski B.: Termodynamika. PWN, Warszawa 1982.					
	eResources addresses	Termodynamika, W, OCE, sem. 2, lato 2021/22 - Moodle ID: 22568 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=22568 Termodynamika, W, OCE, sem. 2, lato 2021/22 - Moodle ID: 22568 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=22568					
Example issues/ example questions/ tasks being completed	1.Present the First Law of Thermodynamics in descriptive and analytical terms, 2. Describe the entropy of solids and liquids, 3. Draw a simple Joule cycle diagram and show graphs of such a cycle in "T-s" and "i-s" systems, and determine the formula for its efficiency, 4. Prove that the work performed by a piston machine in isothermal transformations is not equal for the same piston displacement, 5. Draw a heat graph for water, excluding heat of its pushing, and mark on it the heat						
Work placement	Not applicable						