

## GDAŃSK UNIVERSITY

## Subject card

Subject name and code	Technology and Energy Conversion Machines, PG_00042073								
Field of study	Power Engineering, Power Engineering								
Date of commencement of studies	October 2022		Academic year of realisation of subject			2024/2025			
Education level	first-cycle studies		Subject group			Obligatory subject group in the field of study 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	3		Language of instruction			English			
Semester of study	5		ECTS credits			3.0			
Learning profile	general academic profile		Assessment form			assessment			
Conducting unit	Department of Energy and Industrial Apparatus -> Fa			Faculty of Mechanical Engineering and Ship Technology					
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. inż. Zbigniew Kneba						
	Teachers dr hab. inż. Zbigniew Kneba								
Lesson types and methods	Lesson type	Lecture	Tutorial	Laboratory	Projec	t	Seminar	SUM	
of instruction	Number of study hours	30.0	0.0	15.0	0.0		0.0	45	
	E-learning hours included: 0.0								
Learning activity and number of study hours	Learning activity Participation ir classes include plan		didactic Participation in ed in study consultation hours		Self-study SUM				
	Number of study 45 hours			7.0		23.0		75	
Subject objectives	To familiarize students with machines that convert the energy contained in fuels into other forms of energy. Presentation of methods of propulsion of ships and road vehicles using various types of energy.								
Learning outcomes	Course outcome		Subject outcome			Method of verification			
	[K6_W04] has structured knowledge of mechanics, including the issues of material strength and general principles of shaping structures, necessary to conduct basic strength analyzes and design simple mechanical or construction systems for power industry or environmental engineering; knows the basics of machine construction and the most commonly used construction and operating materials		Is able to determine the forces acting in the mechanisms of high- power engines.			[SW1] Assessment of factual knowledge			
	[K6_W11] has knowledge of known technologies and non- technical aspects to solve simple engineering tasks in the field of energy systems and devices		Knows the methods of engineering calculations of heat exchange systems in combustion power plants.			[SW1] Assessment of factual knowledge			
	[K6_W06] knows classic and developmental energy technologies, rules for the selection and operation of heat and energy devices and installations, basic principles of energy systems operation, basic issues regarding the reliability of energy devices and diagnostics, environmental effects of energy technologies used, methods of using renewable energy sources		Knows the structures of piston machines that convert energy in the professional power industry. Is able to examine the basic operating parameters of machines. Knows how to monitor the operation of piston machines.			[SW1] Assessment of factual knowledge			

Subject contents	Design of high-power engines. Power plants with piston engines. Gym installations. Monitoring engine operating parameters in the power industry. Fuel systems of SI engines. Spark ignition systems. Diesel fuel injection. Unit injectors. Accumulative injection systems for high-power engines. Powering engines with gases. Energy recovery from exhaust heat. Ship drives. Distributed energy. Hybrid powertrains.					
Prerequisites and co-requisites	Technical thermodynamics, general mechanics. Machine construction basics					
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade			
	written exam	50.0%	100.0%			
Recommended reading	Basic literature Combustion engine development Springer Verlag					
	Supplementary literature Klimstra J., Hotakainen M.: Smart power generation					
	eResources addresses	Adresy na platformie eNauczanie:				
Example issues/ example questions/ tasks being completed	Draw a diagram of a stationary gym with deep utilization of waste heat.List the parameters for monitoring the operation of a piston engine in a stationary power plantDraw a diagram of the marine engine cooling system (two-stroke, low-speed)					
Work placement	Not applicable					

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