



Subject card

Subject name and code	Technology and Energy Conversion Machines, PG_00042073						
Field of study	Power Engineering						
Date of commencement of studies	October 2024		Academic year of realisation of subject		2026/2027		
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		Polish		
Semester of study	5		ECTS credits		3.0		
Learning profile	general academic profile		Assessment form		assessment		
Conducting unit	Faculty of Mechanical Engineering and Ship Technology -> Faculties of Gdańsk University of Technology						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. inż. Zbigniew Kneba				
	Teachers		dr hab. inż. Zbigniew Kneba				
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	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 in didactic classes included in study plan		Participation in consultation hours		Self-study	SUM
	Number of study hours	45		7.0		23.0	75
Subject objectives	The aim of the course is to familiarize students with machines processing various types of energy, including mechanical, electrical and thermal energy, with particular attention to the role of internal combustion piston engines in energy and transport.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[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		
	[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		

Subject contents	Course content – lecture		
	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.		
	Course content – laboratory		
	Supply systems, diagnostics of engines.		
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		
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 plant Draw a diagram of the marine engine cooling system (two-stroke, low-speed)		
Practical activities within the subject	Not applicable		

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