GDAŃSK UNIVERSITY OF TECHNOLOGY

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 -> 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 of instruction

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

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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