



Subject card

Subject name and code	Power plants with internal combustion engines design, PG_00064837						
Field of study	Mechanical Engineering						
Date of commencement of studies	February 2026		Academic year of realisation of subject			2026/2027	
Education level	second-cycle studies		Subject group			Specialty subject group 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	1		Language of instruction			Polish	
Semester of study	2		ECTS credits			3.0	
Learning profile	general academic profile		Assessment form			assessment	
Conducting unit	Division of Ecoengineering and Combustion Engines -> Institute of Energy -> Faculty of Mechanical Engineering and Ship Technology -> Faculties of Gdańsk University of Technology						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. inż. Jacek Kropiwnicki				
	Teachers		dr hab. inż. Zbigniew Kneba dr hab. inż. Jacek Kropiwnicki				
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	0.0	15.0	0.0	30
	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	30		11.0		34.0	75
Subject objectives	Improving knowledge of the designing of the stationary and marine power plants with internal combustion engines						
Learning outcomes	Course outcome		Subject outcome			Method of verification	
	[K7_W02] demonstrates a structured and theoretically grounded knowledge of the key topics in Mechanical Engineering enabling the analysis and modelling of mechanical systems, processes and devices		understands the consequences of the selected solutions in terms of achieved energetics parameters of the system			[SW1] Assessment of factual knowledge	
	[K7_U02] formulates and solves technical problems specific to Mechanics and Mechanical Engineering using appropriate tools including CAD and MES systems, and prepares technical documentation		can analyse and evaluate the methods of functioning of the power plants, understands the specificity of propulsion systems with internal combustion engines			[SU1] Assessment of task fulfilment	
	[K7_K13] is ready for responsible performance of professional roles, considering ever-changing need of the society, including self developement and supporting and fulfilling work ethics		is ready to responsibly perform professional roles related to the design and operation of combustion power plants			[SK2] Assessment of progress of work	
	[K7_W13] explains the main principles of individual and teamwork organization, including various forms of entrepreneurship utilizing knowledge from the field of engineering and technical sciences and disciplines relevant to the course of study		explains the basic principles of work organization using knowledge of the operation of combustion power plants			[SW1] Assessment of factual knowledge	

Subject contents	Course content – lecture		
	Tasks and elements (graphic symbols) of land and ship power plants with reciprocating internal combustion engines. Construction of medium and high power engines used in power plants. Design parameters and engine characteristics, thermal balance of the power plant. Cooperation of reciprocating engine with receiver, selection of engine, types of propulsion systems, cooperation of several engines. Main installations of the power plant: cooling, fuel, lubrication, compressed air, steam generation, fresh water production, exhaust gas after treatment, fire protection. Dynamics of drive systems and reduction of vibration and noise from piston engines.		
	Course content – project		
	Design of a cogeneration system, selection of cogeneration modules with combustion engines, boilers and a hot water tank, adoption of efficiency characteristics of cogeneration modules, determination of gas purchase prices and electricity sales prices (with hourly accuracy) and heat sales prices (grupagpec.pl) based on data from the Polish Power Exchange (tge.pl), determination of the balance of the CHP plant operating costs with the applied management strategies.		
Prerequisites and co-requisites	not applicable		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Project development	60.0%	50.0%
	Tests	50.0%	50.0%
Recommended reading	Basic literature	1. Balcerski A.: Siłownie okrętowe: podstawy termodynamiki, silniki i napędy główne, urządzenia pomocnicze, instalacje. Wydaw. PG, 1986. 2. Górski Z., Giernalczyk M.: Basics of ship propulsion. Wydaw. Akademii Morskiej w Gdyni, 2014. 3. Skorek J., Kalina J.: Gazowe układy kogeneracyjne. Wydawnictwa Naukowo-Techniczne, 2005. 4. Babicz J.: Wärtsilä Encyclopedia of Marine Technology. WÄRTSILÄ CORPORATION, 2015. 5. Klimstra J., Hotakainen M.: Smart Power Generation: The Future of Electricity Production. Avain Publishers, 2011.	
	Supplementary literature	http://marine.man.eu https://www.wingd.com	
	eResources addresses		
	Example issues/ example questions/ tasks being completed	1. Prepare specification of fluid parameters in selected point of installation 2. Design passenger ship energetic system	
Practical activities within the subject	Not applicable		

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