GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Power plants with internal combustion engines design, PG_00064932		
Field of study	Mechanical Engineering		
Date of commencement of studies	February 2027	Academic year of realisation of subject	2027/2028
Education level	second-cycle studies	Subject group	Specialty subject group Subject group related to scientific research in the field of study
Mode of study	Part-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		

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	9.0	0.0	0.0	9.0	0.0	18

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	18	11.0	46.0	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_K13] is ready for responsible performance of proffesional roles, considering ever-changing need of the society, including self developement and supporting and fullfiling 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
[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

<table>
<tr><td>Subject contents</td><td>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.</td></tr>
<tr><td>Prerequisites and co-requisites</td><td>not applicable</td></tr>
<tr><td>Assessment methods and criteria</td><td><table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>Tests</td><td>50.0%</td><td>50.0%</td></tr>
<tr><td>Project development</td><td>60.0%</td><td>50.0%</td></tr>
</table></td></tr>
<tr><td>Recommended reading</td><td><table>
<tr><td>Basic literature</td><td>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.</td></tr>
<tr><td>Supplementary literature</td><td>http://marine.man.eu

https://www.wingd.com</td></tr>
<tr><td>eResources addresses</td><td></td></tr>
</table></td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td>1. Prepare specification of fluid parameters in selected point of installation
2. Design passenger ship energetic system</td></tr>
<tr><td>Practical activites within the subject</td><td>Not applicable</td></tr>
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