GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Technology and Power Energy Machines, PG_00042062		
Field of study	Power Engineering, Power Engineering, Power Engineering, Power Engineering, Power Engineering		
Date of commencement of studies	October 2020	Academic year of realisation of subject	2022/2023
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	4.0
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. Jacek Kropiwnicki	
	Teachers	dr inż. Sławomir Makowski dr hab. inż. Jacek Kropiwnicki	

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	10.0	45.0	100

Subject objectives

The aim of the course is to present the issues related to the construction and use of high-efficiency cogeneration energy systems. Presentation of the practical use of distributed energy systems and possibilities of the use of renewable energy in polish conditions. Presentation of the design and use of basic machinery used in small and medium power systems.

Learning outcomes

Course outcome	Subject outcome	Method of verification
K6_W04	Student is able to define the technical requirements for the initial stages of the design of energy systems based on reciprocating engines.	[SW1] Assessment of factual knowledge
K6_W06	Student is able to characterize the technologies used in the combined power and heat systems. Student is able to assess the suitability of each technology and devices in different energy systems. He knows the rules for the selection of the main sources of energy and knows how to combine cooperation of various energy sources.	[SW1] Assessment of factual knowledge

Subject contents

Lecture: Renewable and non-renewable primary energy resources, the role of combustion engines in their use. The role of internal combustion engines in power systems. Construction, applications and working principle of piston engines and compressors. Compressors operating conditions in compressed air and natural gas piping systems. Combustion engines theoretical, comparative and real working cycles. Heat balances and indicators of engine performance. Cooling and lubrication systems of engines. Drives of generators and machines. Economic basis for the engines operating.

Laboratory: Construction of displacement engines and compressors. Fuel systems of internal combustion engines (conventional fuels, biofuels, gaseous fuels). Performance characteristics of internal combustion engines fueled by different fuels. Measurements of basic operating parameters of compressors . Diagnostic measurements of toxic exhaust components.

<table>
<tr><td>Prerequisites and co-requisites</td><td colspan="3">Basic knowledge of thermodynamics, heat transfer and the basis for machine design.</td></tr>
<tr><td>Assessment methods and criteria</td><td colspan="3"><table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>Laboratory reports</td><td>100.0%</td><td>10.0%</td></tr>
<tr><td>Written exam</td><td>50.0%</td><td>90.0%</td></tr>
</table></td></tr>
<tr><td rowspan="3">Recommended reading</td><td>Basic literature</td><td colspan="2">1.Balcerski A.: Siłownie okrętowe : podstawy termodynamiki, silniki i napędy główne, urządzenia pomocnicze. Wydaw. Politechniki Gdańskiej, 1990. 2.Skorek J., Kalina J.: Gazowe układy kogeneracyjne. Wydawnictwa Naukowo-Techniczne 2005. 3.Szargut J., Ziębik A.: Skojarzone wytwarzanie ciepła i elektryczności elektrociepłownie. Wydawnictwo Pracowni Komputerowej Jacka Skalmierskiego 2007.</td></tr>
<tr><td>Supplementary literature</td><td colspan="2">No requirements</td></tr>
<tr><td>eResources addresses</td><td colspan="2">Adresy na platformie eNauczanie:
Technologie i maszyny energetyczne - W/L, E, sem.05, (PG_00042062) - Nowy - Moodle ID: 15213
https://enauczanie.pg.edu.pl/moodle/course/view.php?id=15213</td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td colspan="3">The term of cogeneration and trigeneration.Distributed energy system.Design and use of the combined power and heat energy systems.The construction of combustion engines and compressors.The use of renewable fuels in distributed energy systems.</td></tr>
<tr><td>Work placement</td><td colspan="3">Not applicable</td></tr>
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