GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	, PG_00048767		
Field of study	Green Technologies		
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	English
Semester of study	5	ECTS credits	2.0
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. Tomasz Muszyński	
	Teachers	dr hab. inż. Tomasz Muszyński	

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	15.0	15.0	0.0	0.0	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	5.0	15.0	50

Subject objectives

Presentation of fundamental mechanisms and laws governing the thermodynamics and heat transfer. Familiarization with approaches to the analysis of thermodynamic processes. Analysis of examples of thermodynamic processes and their description. Introduction to the analysis of TD processes using the efficiency criterion. Familiarization with heat exchange processes.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_W01] has a basic knowledge from some branches of mathematics and physics useful for formulating and solving simple problems in the field of environmental technologies and modern analytical methods	Student describes and analyzes thermodynamic transformations and cycles as well as heat transport mechanisms.	[SW1] Assessment of factual knowledge
[K6_W06] has a basic knowledge of chemical engineering, mechanical engineering and chemical equipment, knows and understands basic processes taking place in green, proenvironmental technologies	The student measures the basic thermodynamic parameters and analyzes the balance of machines, process apparatus.	[SW3] Assessment of knowledge contained in written work and projects
[K6_U03] is able to use information and communication technologies relevant to the common tasks of engineering, is able to use known methods and mathematical-physical models to describe and explain phenomena and chemical processes	The student calculates and analyzes simple cases of thermodynamic processes and cycles as well as heat transport mechanisms.	[SU3] Assessment of ability to use knowledge gained from the subject

Subject contents

Basic terms. The first law of thermodynamics for closed and open systems. The properties of perfect, semi-perfect and real gases. Gas rights. Thermal and caloric state equation. Thermodynamic transformations of a perfect gas. Gaseous thermodynamic cycles. The second law of thermodynamics. Entropy. Steam and steam circuits. Basics of heat exchange.

Prerequisites and co-requisites

thermodynamics, fluid mechanics, mathematics, physics

<table>
<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>Tutorial test</td><td>60.0%</td><td>50.0%</td></tr>
<tr><td>final test on lecture</td><td>60.0%</td><td>50.0%</td></tr>
</table></td></tr>
<tr><td rowspan="3">Recommended reading</td><td>Basic literature</td><td colspan="2">lecture notes</td></tr>
<tr><td>Supplementary literature</td><td colspan="2">1. Mayhew R., Engineering thermodynamics/Work & Heat Transfer. J. Wiley & Sons Inc. 1993. USA.

2. Cengel Y.A. Boles M.A. Thermodynamics: An Engineering Approach , McGraw-Hill Education</td></tr>
<tr><td>eResources addresses</td><td colspan="2">Adresy na platformie eNauczanie:
Fundamentals of thermodynamics and heat transfer, W/C, GTM (WCh), sem.04, zimowy 22/23 (PG_00048767) - Moodle ID: 27097
https://enauczanie.pg.edu.pl/moodle/course/view.php?id=27097</td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td colspan="3">Give the equations of the first law of thermodynamics. Describe the Carnot cycle. Describe the Clausius-Rankine cycle. Give the definitions of the second law of thermodynamics. Present the basic mechanisms of heat transfer.</td></tr>
<tr><td>Work placement</td><td colspan="3">Not applicable</td></tr>
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