GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	The impact of energy sector on the climate, PG_00064772		
Field of study	Power Engineering, Power 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	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 Thermal Power Systems -> Institute of Energy -> Faculty of Mechanical Engineering and Ship Technology -> Faculties of Gdańsk University of Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	prof. dr hab. inż. Dariusz Mikielewicz	
	Teachers	mgr inż. Kamil Stasiak	

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	15.0	15.0	0.0	15.0	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	5.0	25.0	75

Subject objectives

The aim of the course is to familiarise students with the impact of energy systems on the climate and its anthropogenic changes.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_W01] explains and describes, based on general knowledge in the field of scientific disciplines forming the theoretical foundations of Power Engineering, the structure, principles of operation and evironmental impact of energy systems, machines and devices, transmission grids and internal installations	Has knowledge of exergetic analysis with environmental cost analysis. Knows the effects of fossil fuel combustion on environmental contaminants	[SW1] Assessment of factual knowledge
[K7_U02] formulates and tests hypotheses concerning problems related to energy conversion processes, their efficiency, control, safety and impact on the environment, as well as simple research problems	Is familiar with the energy strategies of Poland, the European Union and global agreements in the area of anticipated energy mixes and the prevention of climate change	[SU2] Assessment of ability to analyse information

Subject contents

Course content – lecture

1. Basic statistics on energy consumption in Poland, the EU and worldwide. Basic treaties introducing emission limitations. Energy policy of Poland, the EU and the world.

2. Characteristics of the formation of the atmosphere and its changes over time. Models for determining the equilibrium temperature.

3. Causes and mechanisms of climate change.

4. Exergy and the determination of the environmental cost.

5 Determination of the carbon footprint of different energy technologies

6. Prospective low carbon technologies and opportunities for decarbonisation of the Polish economy.

<table>
<tr><td>Prerequisites and co-requisites</td><td>Knowledge of thermodynamics I and II especially in the area of therodynamic cycles.</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>tutorials credit colloquium</td><td>60.0%</td><td>30.0%</td></tr>
<tr><td>lecture credit colloquium</td><td>60.0%</td><td>30.0%</td></tr>
<tr><td>project presentation</td><td>60.0%</td><td>40.0%</td></tr>
</table>
</td></tr>
<tr><td>Recommended reading</td><td>
<table>
<tr><td>Basic literature</td><td>Lecture notes</td></tr>
<tr><td>Supplementary literature</td><td>Any literature on the influence of energy on climate change</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. Composition of the atmosphere at the beginning of the world's formation and at present
2. Causes of climatic forcing
3. Main greenhouse gases, their lifetime in the atmosphere, reasons for their presence in the atmosphere
4 Definition of the equilibrium temperature of the earth's surface
5. Energy balance model of the earth without and with the atmosphere
6 Definition of albedo
7. Basic combustion reactions of primary fuels
8 Definition of exergy and unit costs of energy technologies
9. Causes of acid rain
10. Causes of smog.
11. Examples of low carbon technologies</td></tr>
<tr><td>Practical activites within the subject</td><td>Not applicable</td></tr>
</table>

Document generated electronically. Does not require a seal or signature.