



## Subject card

Subject name and code	The impact of energy sector on the climate, PG_00057270						
Field of study	Power Engineering, Power Engineering, Power Engineering						
Date of commencement of studies	February 2023	Academic year of realisation of subject				2023/2024	
Education level	second-cycle studies	Subject group				Optional 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	Zakład Systemów i Urządzeń Energetyki Ciepłej -> Institute of Energy -> Faculty of Mechanical Engineering and Ship Technology						
Name and surname of lecturer (lecturers)	Subject supervisor		prof. dr hab. inż. Dariusz Mikielewicz				
	Teachers						
Lesson types and methods of instruction	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		7.0		23.0	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_K05] is aware of the impact of engineering activities on the environment		Verified knowledge of thermodynamics of thermodynamic cycles.			[SK2] Assessment of progress of work	
	[K7_W07] knows the environmental effects of energy technologies used; is familiar with the issues of effective energy management and use of renewable energy sources, has a broad and well-established knowledge of the processes of energy production and use		Student is able to demonstrate the basic combustion reactions of basic fuels and determine the carbon footprint from common fuels and technologies.			[SW3] Assessment of knowledge contained in written work and projects	
	[K7_W71] has general knowledge in humanistic, social, economic or legal sciences, including their fundamentals and applications		The energy strategies of Poland, the European Union and global agreements in the area of energy mixes and climate change prevention are presented.			[SW1] Assessment of factual knowledge	
	[K7_U05] is able to integrate technical and economic analysis of the use of various energy technologies, including technologies using renewable energy sources and conventional and nuclear energy		Verified exergetic analysis with environmental cost analysis.			[SU4] Assessment of ability to use methods and tools	

Subject contents	<p>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.</p> <p>2. Characteristics of the formation of the atmosphere and its changes over time. Models for determining the equilibrium temperature.</p> <p>3. Causes and mechanisms of climate change.</p> <p>4. Exergy and the determination of the environmental cost.</p> <p>5 Determination of the carbon footprint of different energy technologies</p> <p>6. Prospective low carbon technologies and opportunities for decarbonisation of the Polish economy.</p>														
Prerequisites and co-requisites	Knowledge of thermodynamics I and II especially in the area of therodynamic cycles.														
Assessment methods and criteria	<table border="1" data-bbox="448 456 1477 591"> <thead> <tr> <th data-bbox="448 456 794 490">Subject passing criteria</th> <th data-bbox="794 456 1141 490">Passing threshold</th> <th data-bbox="1141 456 1477 490">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="448 490 794 524">lecture credit colloquium</td> <td data-bbox="794 490 1141 524">60.0%</td> <td data-bbox="1141 490 1477 524">30.0%</td> </tr> <tr> <td data-bbox="448 524 794 557">project presentation</td> <td data-bbox="794 524 1141 557">60.0%</td> <td data-bbox="1141 524 1477 557">40.0%</td> </tr> <tr> <td data-bbox="448 557 794 591">tutorials credit colloquium</td> <td data-bbox="794 557 1141 591">60.0%</td> <td data-bbox="1141 557 1477 591">30.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	lecture credit colloquium	60.0%	30.0%	project presentation	60.0%	40.0%	tutorials credit colloquium	60.0%	30.0%
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Recommended reading	Basic literature	Lecture notes													
	Supplementary literature	Any literature on the influence of energy on climate change													
	eResources addresses														
Example issues/ example questions/ tasks being completed	<p>1. Composition of the atmosphere at the beginning of the world's formation and at present</p> <p>2. Causes of climatic forcing</p> <p>3. Main greenhouse gases, their lifetime in the atmosphere, reasons for their presence in the atmosphere</p> <p>4 Definition of the equilibrium temperature of the earth's surface</p> <p>5. Energy balance model of the earth without and with the atmosphere</p> <p>6 Definition of albedo</p> <p>7. Basic combustion reactions of primary fuels</p> <p>8 Definition of exergy and unit costs of energy technologies</p> <p>9. Causes of acid rain</p> <p>10. Causes of smog.</p> <p>11. Examples of low carbon technologies</p>														
Work placement	Not applicable														