



Subject card

Subject name and code	The impact of energy sector on the climate, PG_00057270						
Field of study	Power Engineering						
Date of commencement of studies	February 2024	Academic year of realisation of subject			2024/2025		
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	prof. dr hab. inż. Dariusz Mikielewicz dr inż. Paweł Dąbrowski					
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_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		
	[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_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_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			

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="451 461 1487 595"> <thead> <tr> <th data-bbox="451 461 794 495">Subject passing criteria</th> <th data-bbox="794 461 1137 495">Passing threshold</th> <th data-bbox="1137 461 1487 495">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="451 495 794 528">tutorials credit colloquium</td> <td data-bbox="794 495 1137 528">60.0%</td> <td data-bbox="1137 495 1487 528">30.0%</td> </tr> <tr> <td data-bbox="451 528 794 562">project presentation</td> <td data-bbox="794 528 1137 562">60.0%</td> <td data-bbox="1137 528 1487 562">40.0%</td> </tr> <tr> <td data-bbox="451 562 794 595">lecture credit colloquium</td> <td data-bbox="794 562 1137 595">60.0%</td> <td data-bbox="1137 562 1487 595">30.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	tutorials credit colloquium	60.0%	30.0%	project presentation	60.0%	40.0%	lecture 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	Adresy na platformie eNauczenie:													
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														