



## Subject card

Subject name and code	, PG_00061723						
Field of study	Environmental Engineering						
Date of commencement of studies	October 2023	Academic year of realisation of subject			2023/2024		
Education level	second-cycle studies	Subject group			Obligatory subject group in the field of study		
Mode of study	Part-time studies	Mode of delivery			at the university		
Year of study	1	Language of instruction			Polish		
Semester of study	2	ECTS credits			4.0		
Learning profile	general academic profile	Assessment form			assessment		
Conducting unit	Department of Sanitary Engineering -> Faculty of Civil and Environmental Engineering						
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Filip Gamoń					
	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	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		3.0		70.0	103
Subject objectives	The aim of the subject is to analyze legal norms related to the energy sector, mainly renewable energy sources. Discussing various renewable energy technologies and their impact on the environment. A discussion will be held on the possibility of using biomass in the energy sector with a special focus on usability of this material in the energy market in Poland. Discussing the possibilities of recovering resources from waste generated as a result of the exploitation of renewable energy technologies in the context of a closed-loop economy.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K7_U01] can obtain information from literature, databases and other sources; can integrate the obtained information, interpret and critically evaluate them, draw conclusions, and formulate and comprehensively justify the opinions	The student is able to search for information in online and literature databases, and then compare them and draw conclusions.	[SU1] Assessment of task fulfilment [SU2] Assessment of ability to analyse information [SU4] Assessment of ability to use methods and tools [SU5] Assessment of ability to present the results of task
	K7_U04	The student is able to prepare a presentation on a given topic using new literature and trends in renewable energy.	[SU1] Assessment of task fulfilment [SU3] Assessment of ability to use knowledge gained from the subject [SU2] Assessment of ability to analyse information
	K7_W04	Students can design an experiment to evaluate the potential of biomass as a source of renewable energy.	[SW3] Assessment of knowledge contained in written work and projects [SW2] Assessment of knowledge contained in presentation
	K7_U12	The student has in-depth, structured and theoretically underpinned knowledge related to renewable energy, is able to assess its legitimacy, as well as its impact on the environment.	[SU1] Assessment of task fulfilment [SU3] Assessment of ability to use knowledge gained from the subject [SU2] Assessment of ability to analyse information
	[K7_W11] has knowledge to analyze, evaluate and optimize processes, objects and systems of environmental engineering and knows the principles of rational energy management and resources	The student can identify renewable energy sources and evaluate their advantages and disadvantages in the context of the energy market.	[SW1] Assessment of factual knowledge [SW2] Assessment of knowledge contained in presentation [SW3] Assessment of knowledge contained in written work and projects
Subject contents	Detailed discussion of renewable energy sources, with particular emphasis on those that have potential for use in Poland. Discussion of legal norms concerning renewable energy. General overview of technologies and materials used in renewable energy. Detailed discussion of the possibilities of resource recovery from various renewable energy sources, along with the methods that can be applied for their recovery. Discussion of Poland's energy policy assumptions until 2040.		
Prerequisites and co-requisites	The student should have basic knowledge of the types of renewable energy sources and their potential utilization in the energy sector.		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
		51.0%	40.0%
		60.0%	60.0%
Recommended reading	Basic literature	Ryszard Tytko "Renewable energy devices and systems. XVI edition. ECO INVESTMENT SP Z O.O., 2023Nick Jelley "Short course. Renewable energy". PWN Scientific Publishers, 2022Izabela Filipiak, Władysław Mielczarski "Energetyka w okresie transformacji" Wydawnictwo Naukowe PWN, Kraków 2023Document Energy Policy of Poland 2040Scientific articles	
	Supplementary literature	-	
	eResources addresses	Adresy na platformie eNauczenie: Odnawialne i Odpadowe Źródła Energii - Moodle ID: 38514 <a href="https://enauczanie.pg.edu.pl/moodle/course/view.php?id=38514">https://enauczanie.pg.edu.pl/moodle/course/view.php?id=38514</a>	
Example issues/ example questions/ tasks being completed	To familiarize Students with renewable energy sources, the technology used to produce them and how to dispose of the materials. Special attention will be paid to technology using waste energy sources, including agricultural biomass, sewage sludge. The effectiveness of individual renewable energy sources and the possibility of their implementation in Poland will be presented. During the training part, the principle of determining the methane potential for different types of biomass, methods of calculating the methane potential, analysis of the results and possible ways to intensify the methane fermentation process will be introduced.		
Work placement	Not applicable		