



## Subject card

Subject name and code	Sustainable development and bioeconomy, PG_00055879						
Field of study	Power Engineering, Power Engineering, Power Engineering						
Date of commencement of studies	October 2023	Academic year of realisation of subject			2023/2024		
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	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 Environmental Engineering Technology -> Faculty of Civil and Environmental Engineering						
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Aneta Łuczkiwicz					
	Teachers	dr inż. Filip Gamoń dr hab. inż. Aneta Łuczkiwicz					
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	15.0	0.0	0.0	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		6.0		49.0	100
Subject objectives	The aim of the course is to discuss the main threats to the natural environment and the possibility of taking multi-sector mitigation strategy through dialogue and cooperation of various stakeholders. The course will also answer how to implement the philosophy of sustainable development and face the socio-economic and climate change, resource scarcity and digitization. Particular attention will be given to the bioeconomy - technological systems that reduce dependence on fossil fuels by using renewable resources (mainly waste biomass) to create goods and services.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K6_W17] has an elementary knowledge on land mechanics, ground science, land reclamation and geotechnics; has basic knowledge about the composition of air, water and soil, environmental pollution and processes responsible for their formation and ways to reduce them, student knows the principles and organization of sustainable resource management within a circular economy	The student has elementary knowledge of environmental pollution and knows mitigation measures in accordance with the sustainable development, including the circular economy	[SW1] Assessment of factual knowledge
	[K6_W07] knows the basics of economic calculus in the energy sector; knows the legal, organizational and economic principles of the functioning of energy markets, knows the basic principles of management and running a business	The student knows the legal, organizational and economic basis of the energy and bioenergy markets	[SW1] Assessment of factual knowledge
	[K6_W10] knows the basic installations in the field of renewable energy sources and their impact on the environment	The student knows the basic installations of renewable energy production and their impact on the environment	[SW1] Assessment of factual knowledge
	[K6_U13] can read architectural, construction and geodesy drawings, and can use the known computer software to prepare a drawing part of technical documentation for the sanitary, energy, hydropower industry and prepare a text or presentation including a discussion of the implemented results	The student is able to use the computer programs to prepare a drawing part of the technical documentation of fermentation chambers	[SU2] Assessment of ability to analyse information
[K6_W06] knows classic and developmental energy technologies, rules for the selection and operation of heat and energy devices and installations, basic principles of energy systems operation, basic issues regarding the reliability of energy devices and diagnostics, environmental effects of energy technologies used, methods of using renewable energy sources	The student knows the classic and sustainable technologies of energy generation, including the renewable energy sources, the principles of operation of energy systems, basic issues regarding the reliability of energy devices and their environmental impacts	[SW1] Assessment of factual knowledge	
Subject contents	<p>Lectures: Definition and key aspects of sustainable development. From the Millennium Development Goals to the Sustainable Development Goals. The impact of climate change on natural resources. The shape and structure of the current socio-economic challenges and their impact on infrastructure, technology and resource flows. Circular economy. Critical Raw Materials in the EU, including new philosophy for their circulation. Resources in urban and rural areas. Challenges and solutions for renewable energy systems. Reduction of energy demand. Bioeconomy - the use of renewable biological resources and waste biomass for the production of bioenergy and bio-based products.</p> <p>Classes: 1. overview of the anaerobic digestion process, equipment used in laboratory conditions, exemplary results of biogas production; 2. techniques for the intensification of the methane production process, example of the low-temperature disintegration process; 3. the example of a selected biomass processing plant.</p>		
Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Sprawozdania	60.0%	40.0%
	Egzamin	60.0%	60.0%

Recommended reading	Basic literature	<a href="https://www.gov.pl/web/rozwoj-technologie/cele-zrownowazonego-rozwoju">https://www.gov.pl/web/rozwoj-technologie/cele-zrownowazonego-rozwoju</a>  <a href="https://www.knf.gov.pl/dla_ryнку/Finansowanie_zrownowazonego_rozwoju/zrownowazony_rozwoju">https://www.knf.gov.pl/dla_ryнку/Finansowanie_zrownowazonego_rozwoju/zrownowazony_rozwoju</a>  <a href="https://stat.gov.pl/cps/rde/xbcr/gus/Wskazniki_SDI.pdf">https://stat.gov.pl/cps/rde/xbcr/gus/Wskazniki_SDI.pdf</a>  <a href="https://www.kpk.gov.pl/horyzont-europa/klastry/zywnosc-biogospodarka-zasoby-naturalne-rolnictwo-srodowisko">https://www.kpk.gov.pl/horyzont-europa/klastry/zywnosc-biogospodarka-zasoby-naturalne-rolnictwo-srodowisko</a>
	Supplementary literature	-
	eResources addresses	Adresy na platformie eNauczenie: Zrównoważony rozwój i biogospodarka (kier. Energetyka) -2023/2024 - Moodle ID: 30934 <a href="https://enauczenie.pg.edu.pl/moodle/course/view.php?id=30934">https://enauczenie.pg.edu.pl/moodle/course/view.php?id=30934</a>
Example issues/ example questions/ tasks being completed		
Work placement	Not applicable	