



## Subject card

Subject name and code	Air protection , PG_00047996						
Field of study	Environmental Engineering						
Date of commencement of studies	October 2021		Academic year of realisation of subject		2023/2024		
Education level	first-cycle studies		Subject group		Optional subject group Subject group related to scientific research in the field of study		
Mode of study	Part-time studies		Mode of delivery		at the university		
Year of study	3		Language of instruction		Polish		
Semester of study	5		ECTS credits		2.0		
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. Katarzyna Kolečka				
	Teachers						
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	10.0	5.0	0.0	0.0	0.0	15
	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	15		4.0		35.0	54
Subject objectives	Student gains the knowledge of the unit processes related to pollutant emissions, their transformations and technologies for their removal.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[K6_U01] has the ability to self-education, can obtain information from literature, databases and other sources, uses information technology, Internet resources; can integrate the obtained information, make their interpretation, as well as draw conclusions and formulate and justify opinions		The student has the ability to self-study, is able to obtain information from literature, databases and other sources, uses information technologies, internet resources.		[SU3] Assessment of ability to use knowledge gained from the subject		
	[K6_W14] has a structured knowledge of current legal regulations regarding environmental protection, water and construction law; knows the basics of public procurement law, patent law, intellectual property protection and labor protection		The student has an organized knowledge of the current legal regulations concerning air protection.		[SW1] Assessment of factual knowledge		
	[K6_W04] possesses elementary knowledge in the field of 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, knows the principles and organization of sustainable water management		The student has an elementary knowledge of the composition of the air, its pollutants and the processes responsible for their formation and methods of reducing them.		[SW1] Assessment of factual knowledge		

Subject contents	The composition of atmosphere. The structure of atmosphere. The energy balance of the Earth. The meaning of ozonosphere and greenhouse gas emissions for the Earth. The structure of energy production in the European Union and Poland. Energy sources: physical and chemical properties. Processes in atmosphere. Types of air contaminants and their sources. Characteristic of basic contaminants. Emission of main contaminants in Poland. The influence of selected contaminants on the environment. Phenomena occurring on the global and local scale. Air protection against contaminations. Methods, technologies and equipment for the retention of dust and gas produced in the sources of emissions - greenhouse gas dedusting, removing gaseous components. Transformation of solar energy into biomass. Plants of C3 and C4 type. Transformation of CO2 during the combustion of biomass. Refinement of dendromass: woodchips, briquettes, pellets. The biomass potential in Poland. Biomass in agriculture. Biomass conversion processes and their products. The energy crops. Agricultural biogas plants. The physical properties of selected energy crops. Biofuels in the transport sector. Biofuels 1 and 2 generation. Bio-components used in motor fuels.		
Prerequisites and co-requisites	Good knowledge of subject Chemistry (SNPK07)		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Passing the colloquium from lectures	60.0%	100.0%
Recommended reading	Basic literature	[1] Falkowska L., Korzeniewski K.: Chemia atmosfery. Gdańsk: Wydawnictwo Uniwersytetu Gdańskiego, 1995. [2] Juda-Rezler K.: Oddziaływanie zanieczyszczeń powietrza na środowisko. Warszawa: Oficyna Wydawnicza Politechniki Warszawskiej 2000. [3] Zarządzanie energią w miastach (red. Zarzycki R.), PAN Oddział w Łodzi. Komisja Ochrony Środowiska, Łódź, 2004.[4] Szklarczyk M.: "Ochrona atmosfery" Olsztyn 2001, Wyd. Uniwersytetu Warmińsko-Mazurskiego., [3] Klimiuk E., Pawłowska M., Pokój T.: "Biopaliwa. Technologie dla zrównoważonego rozwoju." Wydawnictwo Naukowe PWN, 2012	
	Supplementary literature	[1] Koniecznyński J. Ochrona powietrza przed szkodliwymi gazami. Metody, aparatura i instalacje. Wydawnictwo Politechniki Śląskiej. Gliwice, 2004.	
	eResources addresses	Adresy na platformie eNauczanie:	
Example issues/ example questions/ tasks being completed			
Work placement	Not applicable		