



Subject card

Subject name and code	Air protection, PG_00058785						
Field of study	Environmental Engineering						
Date of commencement of studies	October 2025		Academic year of realisation of subject		2026/2027		
Education level	first-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	2		Language of instruction		Polish		
Semester of study	3		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 -> Faculties of Gdańsk University of Technology						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. inż. Katarzyna KołECKA				
	Teachers						
Lesson types	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						
	eNauczanie source address: https://enauczanie.pg.edu.pl/moodle/course/view.php?id=46837						
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		5.0		20.0	55
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_W13] 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 organized knowledge in the field of current legal regulations concerning air protection		[SW1] Assessment of factual knowledge		
	[K6_K01] can think and act in a creative and enterprising way; can set priorities for the implementation of an individual or group task; understands the need for continuous training and professional responsibility for their activities and team		The student is able to think and act in a creative way, can define priorities for the implementation of tasks, understand the need for continuous training.		[SK4] Assessment of communication skills, including language correctness		
	[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 elementary knowledge of air composition, air pollutants and the processes responsible for their formation and methods of reducing them.		[SW1] Assessment of factual knowledge		
	K6_W12		The student understands basic physical and chemical processes occurring within the atmosphere, particularly in terms of the emission and spread of pollutants		[SW1] Assessment of factual knowledge		

Subject contents	Course content – lecture		
	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. Regulations on air quality - air pollution levels. 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. Energy refinement of dendromass: woodchips, briquettes, pellets. The relative efficiency of combustion of woodchips in comparison to combustion of fossil fuels. 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.		
	Course content – exercises		
	Calculations related to fuel demand and air quality. Calculation of emitter parameters, exhaust gas volume, and pollutant emissions. Preparation of student presentations on selected topics related to air protection and air quality, covering the following topics: 1. Absorption methods in air protection. The phenoenon and process of absorption, absorbers (spray absorbers, packed-bed absorbers, tray absorbers). 2. Adsorption methods in air protection. Theoretical fundamentals of adsorption, adsorbers (activated carbon, inorganic adsorbers). 3. Reduction of nitrogen oxides emissions. 4. Reduction of sulfur oxides emissions, flue gas desulfurization (wet and dry desulfurization methods), coal desulfurization. 5. Gas purification through biodegradation. 6. Membranes in air purification. 7. Odors and their removal. 8. Dusts and their removal. 9. Chief Inspectorate of Environmental Protection tasks related to air protection and monitoring. 10. ARMAAG system 11. Impact of transport on air quality and methods of reducing emissions from the transport sector. 12. Impact of industry on air quality and methods of reducing emissions. 13. Impact of the energy sector on air quality and methods of reducing emissions. 14. Impact of agriculture on air quality and methods of reducing emissions. 15. Indoor air pollution and methods of its reduction. 16. Renewable energy sources biogas plants/biogas. 17. Renewable energy sources wind energy. 18. Renewable energy sources hydropower. 19. Renewable energy sources geothermal energy. 20. Renewable energy sources solar energy. 21. Renewable energy sources heat pumps. 22. Nuclear energy. 23. Effects of climate change.		
Prerequisites and co-requisites	Good knowledge of subject Chemistry (SNPK07)		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Completion of exercises - presentation	50.0%	50.0%
	Passing the lecture test	50.0%	50.0%
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	Basic https://enauczanie.pg.edu.pl/moodle/course/view.php?id=46837 - Platform e-learning	
Example issues/ example questions/ tasks being completed	-		
Practical activites within the subject	Not applicable		

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