



Subject card

Subject name and code	Air protection , PG_00059096						
Field of study	Environmental Engineering						
Date of commencement of studies	October 2024		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	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 -> Faculties of Gdańsk University of Technology						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. inż. Katarzyna Kolečka				
	Teachers						
Lesson types	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						
	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	15		1.0		34.0	50
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_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.		[SW2] Assessment of knowledge contained in presentation		
	[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 creatively, can set priorities to achieve a task, understands the need for continuous learning, and takes professional responsibility for their own work as well as for the team's activities.		[SK4] Assessment of communication skills, including language correctness		
	[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 knowledge regarding current legal regulations on air protection.		[SW2] Assessment of knowledge contained in presentation		
	K6_W12		The student understands the basic physical and chemical processes occurring within the atmosphere.		[SW2] Assessment of knowledge contained in presentation		

Subject contents	Course content – lecture		
	Chemical composition of the atmosphere. Structure of the atmosphere. Earth's energy balance. Importance of the ozone layer and greenhouse gases for Earth's inhabitants. Energy production structure in the European Union and Poland. Energy carriers physical and chemical properties. Processes occurring in the atmosphere. Types of air pollutants and their sources. Characteristics of primary pollutants. Emissions of major pollutants in Poland. Impact of selected pollutants on the environment. Protection of atmospheric air from pollution. Legal acts related to air protection. Renewable energy sources.		
	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 phenomenon 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
	Presentation	60.0%	60.0%
	Class attendance	80.0%	40.0%
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		
Example issues/ example questions/ tasks being completed			
Practical activities within the subject	Not applicable		

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