University of Gdańsk

Subject card

Subject name and code	Environmental protection in chemical industry, PG_00056296		
Field of study	Chemical Business		
Date of commencement of studies	October 2024	Academic year of realisation of subject	2027/2028
Education level	Bachelor's studies	Subject group	Obligatory subject group in the field of study
Mode of study	full-time studies	Mode of delivery	at the university
Year of study	4	Language of instruction	Polish polish
Semester of study	7	ECTS credits	1.0
Learning profile	academic	Assessment form	credit
Conducting unit	Laboratory of Photocatalysis -> Department of Environmental Technology -> Faculty of Chemistry -> Rector		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Anna Malankowska	
	Teachers		

Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	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	2.0	8.0	25

Subject objectives

1. Familiarizing students with the ways in which pollution from industry spreads in the environment,

2. Familiarizing students with the methods of purifying sewage, air and soil resulting from the impact of industry,

3. Developing the ability to independently conduct an experiment,

4. The ability to apply the methodology given in the instructions and interpret the obtained results,

5. The ability to present the results in writing.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[BCHINŻ_U03] Plans, selects the appropriate research and measuring equipment and performs simple chemical experiments; analyses the results and draws conclusions based on them.	Student predicts, verifies and critiques the results of conducted experiments	[SU4] test/exam - oral or written
[BCHINŻ_W01] Describes the relationship between the economy and the functioning of the chemical industry.	The student discusses the advantages and disadvantages of selected water, soil and sewage purification technologies.	[SW4] test/exam - oral or written
[BCHINŻ_W05] Describes the life cycle of devices, facilities and technical systems as well as modern environment-friendly technical solutions.	Student lists and characterizes the basic technologies used for wastewater, water and air purification	[SW4] test/exam - oral or written
[BCHINŻ_U06] Proposes and makes simple devices, operations or unit processes related to the implementation of the technological process used in the chemical industry, taking into account material and energy balances.	Student uses basic technological and chemical concepts describing environmental remediation technologies.	[SU4] test/exam - oral or written
[BCHINŻ_K02] Works individually demonstrating initiative and independence in actions, and effectively cooperates in a team, performing various roles in it.	Student demonstrates creativity in independent and team work.	[SK8] observation of student's independent or team work
[BCHINŻ_W08] Enumerates and describes concepts and principles in the field of protection of industrial property and copyright and the use of patent information resources.	Student independently searches for information in the literature	[SW3] text preparation/written work
[BCHINŻ_K04] Demonstrates responsibility for the safety of her/ his own and others' work.	Student follows established research procedures	[SK1] oral statement/conversation/ discussion
[BCHINŻ_U05] Evaluates the usefulness and functioning of existing engineering and technical solutions as well as research and measurement methods in the chemical industry.	Student presents correct technological reasoning in an understandable way, both orally and in writing.	[SU5] implementation of a problem task

Subject contents

Current state of air, water and soil pollution in the country in terms of the impact of industry. Spread of pollutants in the atmosphere, water and soil. The impact of selected industrial pollutants on living organisms. Classification, characteristics and sources of industrial waste generated in the technological process. Quality parameters of waste gases. Selected methods of reducing the content of pollutants in waste gases; dust removal, removal of sulfur dioxide, nitrogen oxides and hydrocarbons. Methods of separation and storage of CO2. Odor removal. Remediation methods of polluted soils (physicochemical, thermal and biological methods). Selected methods of utilization and disposal of industrial waste. Quality parameters of industrial wastewater. Characteristics of wastewater generated in selected industries. Methods of pre-treatment and purification of wastewater: recovery of raw materials, neutralization, precipitation, sedimentation, flotation, coagulation, oxidation and reduction, biological wastewater treatment, etc. Advanced oxidation technologies for wastewater treatment (AOP). Selection of appropriate treatment methods depending on the quality of wastewater. Discussion of selected technologies for the treatment of wastewater from various industries (refining, textile, food, etc.)

Prerequisites and co-requisites

A. Formal requirements

Basics of general chemistry

B. Prerequisites

Basic knowledge of chemical technology

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Activity during classes	51.0%	10.0%
Written test	51.0%	90.0%

Recommended reading	Basic literature	1. Presentation materials used during classes 2. Zaleska A., Zielińska-Jurek A., Soil remediation technologies, PG Publishing House, Gdańsk 2013. 3. Konieczyński J.: Waste gas purification, Silesian University of Technology, Gliwice 1990.
	Supplementary literature	1. Głowiak B.: Fundamentals of environmental protection, PWN, Warsaw 1985. 2. Kowalik P., Soil environment protection, PWN, Warsaw, 2001. 3. Gworek B (ed.), Soil remediation technologies, Gabriel Borowski Scientific Publishing House, Warsaw 2004.
	eResources addresses	
Example issues/ example questions/ tasks being completed	1. Explain what determines the choice of soil remediation technique? Describe thermal methods used for soil remediation. 2. Explain how to reduce the emission of sulfur compounds into the atmosphere. 3. List methods for reducing CO2 into the atmosphere. Explain what CO2 sequestration methods consist of. 4. Propose a sequence of wastewater treatment processes (in the form of a block diagram) contaminated with: colloidal compounds, microorganisms, solid contaminants, and organic compounds. 5. List and characterize water disinfection methods. 6. Explain what advanced methods for pollutant oxidation consist of (list the methods used and characterize them). 7. List and describe methods used for wastewater treatment.	
Work placement	Not applicable	

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