University of Gdańsk

Subject card

Subject name and code	Environmental technologies for sustainable development, PG_00159521		
Field of study	Chemistry		
Date of commencement of studies	October 2026	Academic year of realisation of subject	2028/2029
Education level	Bachelor's studies	Subject group	Optional subject group
Mode of study	full-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	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	0.0	0.0	30.0	0.0	0.0	30

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	30	3.0	15.0	48

Subject objectives

1. Familiarizing students with methods of wastewater, air and soil purification.

2. Familiarizing students with the characteristics of renewable energy sources.

3. Familiarizing students with methods of obtaining solar, wind and geothermal energy (heat pumps, photovoltaic cells, solar collectors, windmills).

4. Developing the ability to independently conduct an experiment,

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

6. The ability to present the results in writing.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[CHEML3_W06] Chooses higher mathematics techniques to the extent necessary to understand and describe the physical processes important for understanding chemistry.	The student predicts, verifies and criticizes the results of conducted experiments	[SW3] text preparation/written work [SW5] implementation of a problem task
[CHEML3_W05] Has basic knowledge of the chemical specialisation studied.	The student presents correct technological reasoning in an understandable way, both orally and in writing.	[SW4] test/exam - oral or written [SW1] oral statement/ conversation/discussion
[CHEML3_U07] Prepares documented elaboration on a specific problem in the field of selected chemical and physical issues.	The student independently searches for information in the literature	[SU3] text preparation/written work
[CHEML3_K05] Observes established procedures in laboratory work and is responsible for the safety of her/his and others' work.	The student follows established research procedures	[SK6] demonstration of practical skills
[CHEML3_U03] Selects the appropriate equipment and laboratory apparatus for conducting uncomplicated chemical experiments.	The student lists and characterizes basic technologies used for purifying sewage, water and air	[SU3] text preparation/written work [SU8] observation of student's independent or team work

Subject contents

Carrying out exercises thematically related to the purification of soil, sewage, leachate, air and renewable energy. Determination of the efficiency and effectiveness coefficient of a heat pump, solar collector and photovoltaic cells. Removal of sulfur compounds from air and exhaust gases - study of SO2 absorption in a spray scrubber. Advanced oxidation technologies for wastewater treatment (AOP): ozonation of an aqueous phenol solution. Removal of phosphorus and iron compounds. Soil purification using in-situ and ex-situ methods. Application of ion exchange processes.

Prerequisites and co-requisites

A. Formal requirements

1. general chemistry,

2. inorganic chemistry,

3. analytical chemistry.

B. Prerequisites

1. knowledge of basic laboratory techniques;

2. ability to use chemical terminology and nomenclature;

3. knowledge of the properties of chemical elements and compounds and states of matter;

4. knowledge of basic types of chemical reactions;

5. knowledge of basic properties and reactivity of inorganic compounds;

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Activity during classes - conducting experiments	51.0%	10.0%
Written test for each exercise	51.0%	50.0%
Written report	51.0%	40.0%

Recommended reading

Basic literature	Materials in the form of prepared laboratory instructions.

	Supplementary literature	1. Zaleska A., Zielińska-Jurek A., Soil remediation technologies, PG Publishing House, Gdańsk 2013 2. Konieczyński J.: Waste gas purification, Silesian University of Technology, Gliwice 1990. 3. E. Kulgman-Radziemska, Lewandowski W., Proecological renewable energy sources Compendium, PWN Scientific Publishing House, 2017. 4. Kowal A.L., Świderska-Bróż M., Water purification, PWN Scientific Publishing House, Warsaw 2007
	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 pollutants, and organic compounds. 5. Explain what advanced methods of pollutant oxidation consist of (list the methods used and characterize them). 6. Describe the operating principle of a heat pump, solar collector, and photovoltaic cells.	
Work placement	Not applicable	

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