GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Green inorganic technologies, PG_00057603		
Field of study	Green Technologies		
Date of commencement of studies	October 2022	Academic year of realisation of subject	2025/2026
Education level	first-cycle studies	Subject group	Obligatory subject group in the field of study 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	4	Language of instruction	Polish
Semester of study	7	ECTS credits	2.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Department of Chemistry and Technology of Functional Materials -> Faculty of Chemistry -> Wydziały Politechniki Gdańskiej		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Anna Schmidt	
	Teachers		

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	30.0	0.0	0.0	0.0	0.0	30

E-learning hours included: 0.0

Additional information:
stationary classes

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	2.0	18.0	50

Subject objectives

1. Familiarizing students with the principles of designing green technologies.
2. Familiarizing students with examples of processes that meet the principles of sustainable development.
3. Learning examples of processes based on renewable raw materials.
4. Comparing production processes of the same product using renewable and non-renewable raw materials.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_W06] has a basic knowledge of chemical engineering, mechanical engineering and chemical equipment, knows and understands basic processes taking place in green, proenvironmental technologies	The ability to design new processes and modify existing ones in accordance with the requirements of green technologies and sustainable development.	[SW3] Assessment of knowledge contained in written work and projects [SW2] Assessment of knowledge contained in presentation [SW1] Assessment of factual knowledge
[K6_K06] has awareness of the importance of non-technical aspects and effects of engineering activities, including its impact on the environment and the associated responsibility for decisions.	Awareness of the importance of the impact of processes on the natural environment and the need to minimize negative effects.	[SK3] Assessment of ability to organize work [SK5] Assessment of ability to solve problems that arise in practice [SK1] Assessment of group work skills
[K6_W02] has a basic knowledge of chemistry including general chemistry, inorganic, organic, physical, analytical, including the knowledge necessary to describe and understand the phenomena and chemical processes occurring in the environment; measurement and the determination of the parameters of these processes.	The student uses the acquired knowledge to understand technological processes. The student proposes changes to existing technologies aimed at reducing emissions and waste production.	[SW1] Assessment of factual knowledge [SW2] Assessment of knowledge contained in presentation

Subject contents	Introduction to green chemistry. Principles of green chemistry illustrated by modern organic technologies. Introduction to sustainable development. Designing environmentally friendly processes. Green organic reactions on water and in superheated water. Green solvent-free organic reactions. Carbon monoxide (IV) capture technologies. Examples of the use of carbon monoxide (IV) in organic technology. Production of all colors of hydrogen. Examples of green technologies in heavy organic technology. Production of fuels, ethylene, propylene, and butenes. Examples of green technologies in the pharmaceutical industry. Examples of green technologies in polymer production. Green detergents and plant protection products. Green polymers and dyes. Modern catalysts used in organic technology. Modern technologies based on renewable raw materials.
Prerequisites and co-requisites	• Knowledge of industrial analytical techniques. • Knowledge of organic chemistry. • Knowledge of basic techniques of water, air and soil protection. • Basic knowledge of technology and chemical engineering. • Knowledge of green inorganic technologies.

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Solving design, technological, and environmental problems presented during classes. Group work.	60.0%	100.0%

Recommended reading

Basic literature	Nicholas E. Leadbeater, Microwave Heating as a Tool for Sustainable Chemistry, 2010; https://doi.org/10.1201/97814398127096. Andrew P. Dicks, Green Organic Chemistry in Lecture and Laboratory, 2012; https://doi.org/10.1201/b11236 Suresh C. Ameta, Rakshit Ameta, Green Chemistry Fundamentals and Applications, 2014; https://doi.org/10.1201/b15500 Vera M. Kolb, Green Organic Chemistry and Its Interdisciplinary Applications, 2016; https://doi.org/10.1201/9781315371856 Miguel A. Esteso, Ana Cristina Faria Ribeiro, A. K. Haghi, Chemistry and Chemical Engineering for Sustainable Development. Best Practices and Research Directions, 2020; https://doi.org/10.1201/9780367815967 Shrikaant Kulkarni, Ann Rose Abraham, A. K. Haghi, Renewable Materials and Green Technology Products Environmental and Safety Aspects, 2021; https://doi.org/10.1201/9781003055471
Supplementary literature	Current scientific articles devoted to the discussed. issues.
eResources addresses	

Example issues/ example questions/ tasks being completed	Emission of pollutants and production of waste during the production of syngas from various raw materials. Production of organic compounds. Environmental threats. Production of fuels from gas, oil and coal. Environmental threats. Waste management. Technologies without waste.
Work placement	Not applicable

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