GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Green organic technologies, PG_00057602		
Field of study	Green Technologies		
Date of commencement of studies	October 2022	Academic year of realisation of subject	2024/2025
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	3	Language of instruction	Polish
Semester of study	6	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		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Anna Schmidt	
	Teachers	dr hab. inż. Anna Schmidt	

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

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. To acquaint students with the principles of green technology design.
2. To acquaint students with examples of processes that meet the principles of sustainable development.
3. Learning about examples of processes based on renewable raw materials.
4. Comparison of the production processes of the same product from renewable and non-renewable raw materials.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_W04] is aware of the importance of environmental protection and has a basic knowledge of chemical and biological threats to the environment, with particular emphasis on anthropogenic factors, has a basic knowledge of knowledge of the principles of sustainable development as well as national and European environmental management conditions.	The student has knowledge of the role and importance of the environment and sustainable development. The student can define the risks associated with the chemical industry.	[SW2] Assessment of knowledge contained in presentation [SW1] Assessment of factual knowledge [SW3] Assessment of knowledge contained in written work and projects
[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 has the knowledge to understand the processes carried out in organic technology. He/she can propose changes leading to reduction of emissions and waste.	[SW1] Assessment of factual knowledge [SW2] Assessment of knowledge contained in presentation [SW3] Assessment of knowledge contained in written work and projects
[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.	The student understands the impact of the actions taken on the environment and recognizes their environmental, economic and legal aspects.	[SK1] Assessment of group work skills [SK4] Assessment of communication skills, including language correctness [SK5] Assessment of ability to solve problems that arise in practice

Subject contents	Introduction to green chemistry. The Twelve Principles of Green Chemistry. Innovative aspects of green chemistry. Green organic reactions "on water" and in superheated water. Green "solvent free" organic reactions. Introduction to sustainable development. Examples of green technologies in heavy organic technology. Examples of green technologies in the pharmaceutical industry. Examples of green technologies in the production of polymers. Green detergents and plant protection products. Green polymers and dyes. Green organic catalysts. Other modern technologies based on renewable raw materials. Comparison of the production processes of hydrogen, alkenes and fuels from biomass with similar processes using methane. Organic adsorbents used in water treatment.
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 tasks related to green organic technologies.	60.0%	50.0%
Active participation in discussions during lectures	60.0%	50.0%

Recommended reading

Basic literature	1. Nicholas E. Leadbeater, Microwave Heating as a Tool for Sustainable Chemistry, 2010; https://doi.org/10.1201/97814398127096. 1. Andrew P. Dicks, Green Organic Chemistry in Lecture and Laboratory, 2012; https://doi.org/10.1201/b11236 1. Suresh C. Ameta, Rakshit Ameta, Green Chemistry Fundamentals and Applications, 2014; https://doi.org/10.1201/b15500 2. Vera M. Kolb, Green Organic Chemistry and Its Interdisciplinary Applications, 2016; https://doi.org/10.1201/9781315371856 3. 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 1. 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	Scientific articles directly related to the topic in question.
eResources addresses	Adresy na platformie eNauczanie:

Example issues/ example questions/ tasks being completed	1. Based on the calculated environmental parameters, make the right choice of raw materials for the process. 2. Discuss examples of technologies implemented in solvent-free conditions. 3. What are the limitations of these methods? 4. Environmental problems resulting from the use of biomass in the production of hydrogen. 5. Environmental problems in the production of natural dyes and detergents. Is bioethanol dehydration an example of green technology? 6. Is propene production from waste glycerin obtained during biodiesel production really a green technology?
Work placement	Not applicable

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