GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	, PG_00048771		
Field of study	Green Technologies		
Date of commencement of studies	October 2021	Academic year of realisation of subject	2023/2024
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	English
Semester of study	6	ECTS credits	2.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Department of Colloid and Lipid Science -> Faculty of Chemistry		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. Christian Jungnickel	
	Teachers	dr hab. Christian Jungnickel	

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:
https://enauczanie.pg.edu.pl/moodle/course/view.php?id=29658

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

The lectures series will focus on the principles of inorganic chemical processes and chemical technologies, and their associated environmental/green issues. The series will outline in each lecture a new chemical process and discuss environmental and green issues.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[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 will analyze a variety of chemical technologies and processes, and in each case will learn the environmental distribution and effect on man and mankind. For each, a green alternative will be discussed.	[SW3] Assessment of knowledge contained in written work and projects
[K6_U04] capable of formulating and solving design tasks in the field of environmental technology to recognize their non-technical aspects, including environmental, economic and legal. Is capable of applying the principles of occupational health and safety. Is able to make initial assessment of engineering solutions and actions	The risk of each chemical technology and process will be analyzed. And for each, the student will learn to recognize the occupational health and safety risks, where applicable. The student will then propose greener alternatives.	[SU2] Assessment of ability to analyse information

Subject contents

The lecture will focus on inorganic chemical process design, and ecological aspects of these processes. The lectures series will start with a discussion on the principles of green chemistry and green engineering. Other issues will include risk assessment, and environmental fate analysis, inorganic chemical process design and development. Working without organic solvents. Principles of particle size reduction and flotation. Solid catalysts, their function, and application. Solid acids and bases. Agrochemicals and Manufacturing of fertilizer - alternative agriculture. Metallurgy and heavy metals, including lead, zinc and iron smelting. Separation techniques in chemical and environmental technology. Surface chemistry and its importance in chemical and environmental technology. Green nanoparticles, and their synthesis. Landfill design, and optimization.

<table>
<tr><td>Prerequisites and co-requisites</td><td colspan="3"></td></tr>
<tr><td>Assessment methods and criteria</td><td colspan="3"><table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>Test 2</td><td>50.0%</td><td>50.0%</td></tr>
<tr><td>Test 1</td><td>50.0%</td><td>50.0%</td></tr>
</table></td></tr>
<tr><td rowspan="3">Recommended reading</td><td>Basic literature</td><td colspan="2">Albert S. Matlak, Introduction to Green Chemistry, Marcel Dekker, New York, 2001

Perosa, A., & Zecchini, F. (2007). Methods and reagents for green chemistry: an introduction . John Wiley & Sons.

Davim, J. Paulo, ed. Green manufacturing processes and systems . Berlin: Springer, 2013.

Rothenberg, G. (2017). Catalysis: concepts and green applications . John Wiley & Sons.</td></tr>
<tr><td>Supplementary literature</td><td colspan="2">Booker, JR, Brachman, R., Quigley, RM, & Rowe, RK (2004). Barrier systems for waste disposal facilities . Crc Press.

Judd, S. (2010). The MBR book: principles and applications of membrane bioreactors for water and wastewater treatment . Elsevier.</td></tr>
<tr><td>eResources addresses</td><td colspan="2">Adresy na platformie eNauczanie:</td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td colspan="3">• Water content of a soil has a significant influence on the distribution of fertilizer / contaminants. Why?
• How to determine the fate of a chemical in the environment?
• What are the differences between Langmuir and Freundlich isotherm?</td></tr>
<tr><td>Work placement</td><td colspan="3">Not applicable</td></tr>
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