University of Gdańsk

Subject card

Subject name and code	Monographic lecture - Modern technologies in industry, PG_00052393		
Field of study	Chemistry		
Date of commencement of studies	October 2024	Academic year of realisation of subject	2025/2026
Education level	Master's studies	Subject group	Obligatory subject group in the field of study Optional subject group
Mode of study	full-time studies	Mode of delivery	at the university
Year of study	2	Language of instruction	Polish Polish language
Semester of study	3	ECTS credits	3.0
Learning profile	academic	Assessment form	credit
Conducting unit	Faculty of Chemistry -> Rector		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. Dagmara Jacewicz	
	Teachers		

Lesson types

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	5.0	40.0	75

Subject objectives

The aim of the course is to familiarize students with modern technologies used in industry, i.e. to familiarize students with all the issues mentioned in the program content of the lecture.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[CHEMMU2_W01] Uses knowledge of spectroscopic methods of chemical compound analysis.	The student knows the division of spectroscopic methods for the analysis of chemical compounds and is able to apply them in practice.	[SW4] test/exam - oral or written
[CHEMMU2_W05] Has extended knowledge in the field of the specialisation studied.	Student: defines and presents modern technologies; describes, illustrates and explains their functioning; discusses the impact of the discussed technologies on the natural environment.	[SW4] test/exam - oral or written
[CHEMMU2_W11] Demonstrates general knowledge about the current trends in the development of chemistry as a science and the latest discoveries in this field.	The student assesses the usefulness and functioning of existing engineering and technical solutions as well as research and measurement methods in the industry; uses chemical knowledge in correlation with others natural sciences to explain the course of phenomena encountered in everyday life.	[SW4] test/exam - oral or written
[CHEMMU2_K01] Knows the limitations of her/his own knowledge; understands the need for further education and can inspire other people to do so.	The student understands the need for continuous education; demonstrates responsibility for timely completion of tasks; is aware of the need for honest and reliable work.	[SK4] test/exam - oral or written

Subject contents

1. Pharmaceutical industry

2. Production of plant protection products

3. Application of stop-flow technique in industry

4. Catalysts and large-scale catalytic processes

5. Gas separation techniques

6. Porous materials used for gas separation

7. Carbon dioxide separation, conversion and storage techniques

8. Production of hydrogen, including biohydrogen

9. Hydrogen storage and transport

10. Energy storage

11. Photovoltaic cells

Prerequisites and co-requisites

Basic knowledge of inorganic and organic chemistry

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
written test and open-ended questions	51.0%	100.0%

Recommended reading	Basic literature	1. Shaping techniques of adsorbents and their applications in gas separation: a review, J. Mater. Chem. A, 2022,10, 22853-22895 2. Zeolites and metalorganic frameworks for gas separation: the possibility of translating adsorbents into membranes, Chem. Soc. Rev., 2023, 52, 4586-4602 3. CO2 Separation, Purication and Conversion to Chemicals and Fuels, Franz Winter, Rashmi Avinash Agarwal, Jan Hrdlicka, Sunita Varjani, ISSN 2522-8366 4. The Potential Applications of Nanoporous Materials for the Adsorption, Separation, and Catalytic Conversion of Carbon Dioxide, Adv. Energy Mater., 4: 1301873 5. Energy technologies, Tadeusz Chmielak, PWN, 2018 6. Hydrogen energy, Tadeusz Chmielak, PWN, 2020
	Supplementary literature	1. A review of air separation technologies and their integration with energy conversion processes, Fuel Processing Technology, 70, 2, 2001, 115-134 2. Fundaments of Energy generation, Ewa Klugmann-Radziemska, Wydawnictwo PG, 2009 3. Biopaliwa- technologie dla zrównoważonego rozwoju, Ewa Klimiuk, Małgorzata Pawłowska, Tomasz Pokój, PWN, 2012
	eResources addresses	
Example issues/ example questions/ tasks being completed	1. Pharmaceutical industry - innovative technologies in pharmacy 2. Stages of preparing a tablet using 3D printing 3. Application of the "hot-melt extrusion" technique in the pharmaceutical industry 4. Modern equipment used to test granulation 5. Tank-mix technique 6. Stopped-flow technique	
Work placement	Not applicable	

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