University of Gdańsk

Subject card

Subject name and code	Design of energy-efficient technological processes, PG_00080786						
Field of study	Chemical Business						
Date of commencement of studies	October 2024		Academic year of realisation of subject		2026/2027		
Education level	Bachelor's studies		Subject group		Obligatory subject group 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 polish		
Semester of study	5		ECTS credits		1.0		
Learning profile	academic		Assessment form		credit		
Conducting unit	Faculty of Chemistry -> Rector						
Name and surname of lecturer (lecturers)	Subject supervisor		dr inż. Anna Gołąbiewska				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	0.0	0.0	0.0	15
	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	15		2.0		8.0	25
Subject objectives	Aims of education To familiarize students with processes, technologies friendly to the environment and the development of practical skills in the field of modern industrial processes/installations To acquaint students with the design of the technological process in terms of biogas and biodiesel production using renewable raw materials and waste						

Learning outcomes

Course outcome	Subject outcome	Method of verification
[BCHINŻ_U05] Evaluates the usefulness and functioning of existing engineering and technical solutions as well as research and measurement methods in the chemical industry.	-defines the basic concepts of environmental technologies - lists examples of green technologies - lists and describes processes used in the processing, usage and disposal of waste	[SU4] test/exam - oral or written
[BCHINŻ_W07] Describes the construction and operating principles of basic scientific, technological and control-measuring apparatus.	- describes the construction and operating principles of installations for the production of biogas and biodiesel, lists the basic factors affecting the efficiency of these processes	[SW4] test/exam - oral or written [SW2] presentation/project/paper/ report
[BCHINŻ_K05] Is convinced of the importance of behaving in a professional manner in every situation, taking full responsibility in the field of engineering activities and their impact on the natural environment and compliance with the principles of professional ethics.	- is aware of the negative impact of waste on the environment - is aware of the dangers resulting from degradation of the natural environment and the need for changes in technology - is aware of the importance and understands the non-technical aspects and effects of engineering activities, including its impact on the environment and the related responsibility for the decisions made	[SK2] presentation/project/paper/ report [SK4] test/exam - oral or written
[BCHINŻ_U03] Plans, selects the appropriate research and measuring equipment and performs simple chemical experiments; analyses the results and draws conclusions based on them.	- describes the impact of selected installations/lines/technological processes on the environment - examines the basic physico-chemical properties of waste and products resulting from their management. - can interpret the results of laboratory tests. - is able to prepare written reports on the implementation of experiments.	[SU2] presentation/project/paper/ report [SU4] test/exam - oral or written
[BCHINŻ_K02] Works individually demonstrating initiative and independence in actions, and effectively cooperates in a team, performing various roles in it.	- cooperates in the team during laboratory classes and results development - connects the importance of developing waste management technologies for good environmental and human health - understands the need for further education	[SK2] presentation/project/paper/ report [SK8] observation of student's independent or team work
[BCHINŻ_W06] Enumerates basic unit processes and describes issues in the field of technology and chemical engineering.	- lists and distinguishes processes and unit operations in chemical and process technology	[SW4] test/exam - oral or written
[BCHINŻ_U06] Proposes and makes simple devices, operations or unit processes related to the implementation of the technological process used in the chemical industry, taking into account material and energy balances.	- can choose the parameters of the technological process to minimize the negative environmental impacts	[SU2] presentation/project/paper/ report [SU4] test/exam - oral or written

Subject contents

The course will discuss environmentally friendly technologies and ways to verify them. Such as technologies for the production of biofuels from biomass, waste or renewable raw materials. The issues of the course will also include principles/elements of designing energy-efficient industrial processes, implementation of new technologies to the industry. Rational management of natural resources and clean production will be discussed.

Prerequisites and co-requisites

Prerequisites:

Knowledge of the basics of mathematics, physics, chemistry, technical drawing, computer use, chemical apparatus, technological principles

additional requirements:

Mathematics, physics, chemistry, chemical technology

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
written test (geminification)	51.0%	100.0%

Recommended reading	Basic literature	Rosik-Dulewska C., Podstawy gospodarki odpadami, PWN, Warszawa 2015 Kasprzycka-Guttman T. (red.), Odpady stałe, ciekłe i gazowe zapobieganie, powstawanie, utylizacja, OW Forest, Warszawa 2009 Jedrczak A., Biologiczne przetwarzanie odpadow, PWN, Warszawa 2007 Bilitewski B., Hardtle G., Marek K., Podrecznik gospodarki odpadami, Wydawnictwo Seidel Przywecki, Warszawa 2006 Burczyk B. Zielona Chemia, Oficyna Wydawnicza Politechniki Wroclawskiej, Wroclaw 2006 Lewandowski W.M. Proekologiczne zrodla energii odnawialnej, WNT W-wa 2001 Gradziuk P., Kowalczyk K., Koscik B., Biopaliwa, Wydawnictwo Wies Jutra 2002r
	Supplementary literature	olny T. (red.pl) Sprawdzone metody gospodarowania odpadami komunalnymi, Stowarzyszenie Technologii Ekologicznych SILESIA, Opole 2010 Wardasz A.J., Paliwa z odpadow. Technologie tworzenia i wykorzystania paliw z odpadow, PZIiTS, Poznan 2011
	eResources addresses	
Example issues/ example questions/ tasks being completed	1. Please list homogeneous catalysts in the biodiesel production process and write their advantages and disadvantages.2. List and describe the factors influencing the course of methane fermentation.3. Write the side reactions of the Fischer-Tropsch synthesis, and Bouduard reactions, explain why	
Work placement	Not applicable	

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