



Subject card

Subject name and code	Refinery technologies - petrochemical, PG_00068882						
Field of study	Chemical Technology						
Date of commencement of studies	October 2025	Academic year of realisation of subject				2027/2028	
Education level	first-cycle studies	Subject group				Optional subject group 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				3.0	
Learning profile	general academic profile	Assessment form				assessment	
Conducting unit	Department of Chemistry and Technology of Functional Materials -> Faculty of Chemistry -> Faculties of Gdańsk University of Technology						
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Anna Schmidt					
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	15.0	15.0	0.0	60
	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	60		5.0		10.0	75
Subject objectives	The student learns the practical aspects of the production of petroleum products. The student is able to combine theoretical knowledge with the processes of the refinery and petrochemical industry.						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	[K6_K01] Is aware of the social role of a technical university graduate and understands the need to provide information about technical achievements and engineering activities to society, including through the media.	is aware of the social role of engineering in refinery and petrochemical technologies and understands the need to communicate information about technological achievements, industrial processes and their environmental impact to society, including through various forms of media.			[SK1] Assessment of group work skills [SK3] Assessment of ability to organize work [SK5] Assessment of ability to solve problems that arise in practice		
	[K6_U01] Is able to independently plan the learning process and acquire, analyse and interpret information from various sources, also in English.	is able to independently obtain, analyze and interpret information on refinery and petrochemical processes from various sources, including scientific literature, technical documentation and databases, also in English.			[SU2] Assessment of ability to analyse information [SU3] Assessment of ability to use knowledge gained from the subject		

Subject contents	<p>Course content – lecture</p> <p>Basic aspects of safety in a plant processing hydrocarbon raw materials. Refinery industry raw materials. Geochemistry of crude oil and natural gas deposits. Extraction and preparation for transporting oil and natural gas. Storage. Catalysts of the refining industry. Hydrotreating, isomerisation of gasolines. Catalytic reforming. Hydrocracking and catalytic cracking. Hydrogen production. Light hydrocarbon conversion. Production of oil bases, lubricants, hydraulic fluids and asphalts. Steam cracking. Production of polyethylene and polypropylene. Separation and application of aromatic compounds. Processes of thermal conversion of heavy fractions. The process of delayed coking and Visbreaking. Treatment of sewage, waste gases and management of solid waste.</p>
	<p>Course content – laboratory</p> <ol style="list-style-type: none"> 1. Investigation of the physical properties of crude oil samples 2. Analysis of aromatic compounds (TLC/UV-Vis) 3. Determination of the content of paraffins, aromatic compounds, resins, and asphaltenes in crude oil samples 4. Determination of water and chloride content in crude oil 5. Fractional distillation of crude oil 6. Adsorptive purification of a model hydrocarbon mixture 7. Investigation of the properties of fractions obtained during distillation 8. Investigation of the properties of fractions obtained from secondary processing of crude oil 9. Model thermal cracking of paraffin 10. Wastewater treatment using chemical and adsorption methods
	<p>Course content – project</p> <p>Project classes will be conducted in the form of brainstorming sessions. The project group will be divided into smaller teams of 3-4 students. Each team will be assigned a hypothetical problem to solve. The proposed solutions will then be presented and discussed collectively.</p> <p>Proposed Topics</p> <ol style="list-style-type: none"> 1. How to design a mini refinery? 2. How to reduce emissions in a refinery? 3. What to do with heavy crude oil fractions? 4. How to produce hydrogen most efficiently? 5. Design of an environmentally friendly petrochemical installation 6. What to do with refinery waste? 7. How to increase the octane number of fuel? 8. Safety in a refinery hazard identification 9. Does petrochemistry have a future? 10. Design of a polyethylene production plant

Prerequisites and co-requisites	Basic knowledge in the field of unit operations: distillation, extraction, crystallization and processes: hydrogenation, dehydrogenation, aromatization, isomerization, alkylation and hydrotreating. Apparatus of the chemical industry.		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	project (15 hours); multimedia presentation and / or written study	0.0%	15.0%
	seminar (15 hours), multimedia presentation, report	0.0%	15.0%
	Written exam (2 hours)	60.0%	55.0%
	laboratory (30 hours); written test and reports	0.0%	15.0%
Recommended reading	Basic literature	<ol style="list-style-type: none"> Edward Grzywa and Jacek Molenda "Technology of basic organic syntheses" Wydawnictwo Naukowo-Techniczne, Warsaw 2000 and later editions Collective work edited by Ludwik Synoradzki and Jerzy Wisiański "Design of technological processes" Publishing House of the Warsaw University of Technology, Warsaw 2006 Collective work edited by Jan Surygała "Vademecum refinera" Scientific and Technical Publishers, Warsaw 2006 Maria Ziółek, Izabela Nowak "Heterogeneous catalysis - selected issues for laboratory exercises" Wydawnictwo Naukowe UAM, Poznań Lectures conducted by employees of LOTOS grup. 	
	Supplementary literature	<ol style="list-style-type: none"> Romuald Bogoczek and Elżbieta Kociołek-Balawejder "Organic chemical technology" Publisher of the University of Economics in Wrocław, Wrocław 1992 Congress and conference materials. Patents Magazines dedicated to energy carriers (oil and natural gas). 	
	eResources addresses		
Example issues/ example questions/ tasks being completed	<ol style="list-style-type: none"> Compare hydrogen production technologies. List the main pros and cons of known processes (steam reforming of methane and light hydrocarbons; gasification of coal and residues from crude oil processing; electrolysis of water and aqueous hydroxide solutions). Methods of hydrocarbon exploration and extraction. Type of reservoir rocks, differences between conventional and unconventional deposits. Oil exploration methods, estimating potential resources. Drilling and methods of mining the deposit. Refinery operating rules. Energy and auxiliary utilities (electricity, water and steam systems, air and nitrogen, heating gas and heating oil). Thermal cracing, catalytic cracing and hydrocracking. Raw materials, process flow, products. Production of gasoline and diesel oil. 		
Practical activities within the subject	Not applicable		

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