

## 。 GDAŃSK UNIVERSITY OF TECHNOLOGY

## Subject card

Subject name and code	, PG_00062833							
Field of study	Recycling and Energy Recovery							
Date of commencement of studies	October 2023		Academic year of realisation of subject		2023/2024			
Education level	first-cycle studies		Subject group					
Mode of study	Full-time studies		Mode of delivery		at the university			
Year of study	1		Language of instruction		Polish			
Semester of study	2		ECTS credits		3.0			
Learning profile	general academic profile		Assessment form		assessment			
Conducting unit	Department of Organic Chemistry -> Faculty of Chemistry							
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. Sławomir Makowiec						
	Teachers		dr hab. Sławomir Makowiec					
			dr inż. Karolina Kucharska					
			dr inż. Agata Sommer					
			dr inż. Jan Alfuth					
			dr inż. Karol Biernacki					
			drhah int Hanna Staroszczyk					
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project		Seminar	SUM
	Number of study hours	20.0	0.0	20.0	0.0		0.0	40
	E-learning hours included: 0.0							
Learning activity and number of study hours	Learning activity Participation ir classes include plan		didactic Participation in d in study consultation hours		Self-study		SUM	
	Number of study hours	40		5.0		30.0		75
Subject objectives	The student acquires basic knowledge and skills in organic chemistry. Learning the chemical and physical properties of basic groups of organic compounds. Learning examples of practical use of knowledge about the reactivity of organic compounds in the context of the synthesis of fuel additives, biomass processing, and polymer modification.							

Learning outcomes	Course outcome	Subject outcome	Method of verification			
	[K6_W01] demonstrates knowledge and understanding of mathematics and other exact sciences and engineering disciplines at the level necessary to solve theoretical, engineering and technological problems and issues.	The student knows what reactions the main groups of organic compounds undergo. The student knows what physicochemical properties have the main groups of organic compounds.	[SW3] Assessment of knowledge contained in written work and projects [SW1] Assessment of factual knowledge			
	[K6_W02] analyzes engineering and technological issues and problems in the area of raw materials and energy recovery using appropriate and appropriate analytical, numerical and experimental tools and methods	The student knows what methods of separating mixtures of organic compounds to use depending on their chemical and physical properties.	[SW3] Assessment of knowledge contained in written work and projects [SW1] Assessment of factual knowledge			
	[K6_U01] applies knowledge of mathematics and other exact sciences and engineering disciplines to solve theoretical, engineering and technological problems and issues.	The student is able to determine the basic physicochemical properties of a compound based on its structure.	[SU2] Assessment of ability to analyse information [SU3] Assessment of ability to use knowledge gained from the subject			
	[K6_U02] solves engineering issues and problems in the area of raw materials and energy recovery through the use of appropriate analytical, numerical and experimental tools and methods.	The student is able to carry out a simple physical or chemical process of separating mixtures of organic compounds into individual components.	[SU3] Assessment of ability to use knowledge gained from the subject [SU2] Assessment of ability to analyse information			
Subject contents						
Proroquipitos	Lecture topics1 Introduction to coal chemistry. Structural formulas - ways of writing the structure of molecules. Isomerism of organic compounds. Alkanes, alkenes, alkynes, aromatic hydrocarbons, reactivity, chemical and physical properties. methods of preparation and purification. Acids, bases, electrophiles, nucleophiles, radicals - brief characteristics. 2 Alcohols, phenols and ethers. Preparation, reactivity, physical properties. The use of alcohols and ethers as fuel additives. Chemical basis of the process of increasing the octane number of gasoline.3 Carbonyl compounds: ketones, aldehydes, carboxylic acids, esters and amides. Synthetic methods of production and natural sources. Reactivity and physical properties. Chemistry of the biodiesel production process. 4 Organic compounds containing nitrogen: amines, nitriles, amides, amino acids, ureas, isocyanates. Reactivity and preparation methods. Heterocyclic compounds structure and physical properties. Mays to receive. Monomer synthesis methods. Polymerization and polycondensation. Depolymerization reactions. Polymer degradation6. Natural polymers. Celluiose, starch, glycogen, proteins. Structure and the resulting chemical and physical properties. Methods of modifying natural polymers. T. Decomposition processes of natural polymers. Natural polymers as a component of biomass for energy purposes. 8. Biochemical conversion of biomass. Biochemical conversion of biomass. Biochemical conversion of biomass. Photolysis, anaerobic digestion, dark fermentation and photofermentation. 10. Thermochemical conversion of buyers. Chemical transformations of by-products in the inquid phase. Biorefining. Topics of laboratory classes A Separation of multi-component mixtures 1 Separation of a multi-component mixture containing acide, basic can neutral compounds. Preparation of a multi-component mixture containing acide, basic can neutral compounds. Preparation of products obtained from the extraction. Tyrelitation of frus of fact on previously obtained from the extraction. Cry					
Prerequisites and co-requisites	Knowledge of basic chemical laws a	nd concepts.Knowledge of basic phy	sical laws and concepts.			

Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade		
		60.0%	20.0%		
		60.0%	40.0%		
		60.0%	20.0%		
		60.0%	20.0%		
Recommended reading	Basic literature	Robert Thornton Morrison , John Bo PWN 2011 John McMurry - Chemia Organiczna	ison , John Boyd - Chemia Organiczna Tom 1,2,3 nia Organiczna Tom 1,2,3 PWN 2000		
	Supplementary literature	Przemysław Mastalerz - Chemia Organiczna PWN 1986			
	eResources addresses	Adresy na platformie eNauczanie:			
	Podstawy chemii organicznej - Moodle ID: 38535 https://enauczanie.pg.edu.pl/moodle/course/view.php?id		odle ID: 38535 e/course/view.php?id=38535		
Example issues/ example questions/ tasks being completed					
Work placement	Not applicable				

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