



Subject card

Subject name and code	Organic Chemistry, PG_00054705						
Field of study	Biotechnology						
Date of commencement of studies	October 2022		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	2		Language of instruction		Polish		
Semester of study	4		ECTS credits		5.0		
Learning profile	general academic profile		Assessment form		exam		
Conducting unit	Department of Organic Chemistry -> Faculty of Chemistry						
Name and surname of lecturer (lecturers)	Subject supervisor		prof. dr hab. inż. Maria Milewska				
	Teachers		prof. dr hab. inż. Maria Milewska dr inż. Jan Alfuth dr hab. inż. Grzegorz Cholewiński				
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	30.0	0.0	0.0	0.0	60
	E-learning hours included: 0.0						
	Additional information: The mark is one and only after meeting both conditions (passing the exercises, and lecture tests), the positive marks: final and partial are entered into mojaPG.						
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		10.0		55.0	125
Subject objectives	A main goal is to teach students basic problems of organic chemistry including: the structure, properties reactions and reactions mechanisms of organic compounds						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	K6_U02		Student is able to predict the potential biological properties of biomolecules and organic compounds based on knowledge of their chemical structure		[SU1] Assessment of task fulfilment		
	K6_W03		The student has knowledge of monofunctional organic and natural compounds with particular emphasis on the reaction mechanisms for their synthesis and biological activity of biomolecules		[SW1] Assessment of factual knowledge		

Subject contents	Aromatic hydrocarbons			
	Alkadiens. Aromaticity, benzenoic and nonbenzenoic aromatic systems. Hydrogenation of benzene ring. Electrophilic substitution. Side chain reactions in substituted aromatic compounds. Aromatic hydrocarbons of condensed rings. Oil cracking, reforming, octan number			
	Aldehydes and ketones			
	Nomenclature, preparation and chemical properties, nucleophilic addition to the carbonyl group, oxidation and reduction, the Cannizzaro reaction, enols and enolates, the aldol condensation, halogenation, the haloform reaction.			
	Carboxylic acids and their derivatives			
	Nomenclature, acidity, preparation, reactions, carboxylic acid derivatives: esters and amides; nucleophilic acyl substitution, decarboxylation, dicarboxylic acids, halogeno and hydroxy acids; keto-acids - ketoacid decarboxylation reaction; carbonic acid derivatives,			
	Synthesis and reactions of -dicarbonyl compounds			
	the Claisen condensation, acetoacetic and malonic ester syntheses; barbiturates.			
	Nitrogen organic compounds			
	Amines nomenclature, basicity, preparation, reactions, diazonium salts, the Sandmayer reaction; nitriles. Nitro compounds preparation and reactions.			
	Phenols and aryl halides			
	Phenols preparation, acidic properties, electrophilic substitution, oxidation, Aryl halides SNAr reactions			
	Heterocyclic compounds			
	structure, aromaticity, preparation and reactions			
	Sulphur compounds			
	electronic structure, preparation			
	Natural compounds			
	carbohydrates, amino acids. peptides, proteins structure, preparation and typical reactions			
	Prerequisites and co-requisites	Structure of elements and their compounds, especially carbon; acids, bases and salts; reaction types, geometry of molecules.		
		Completed the first part of the subject Organic Chemistry.		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade	
	Midterm colloquium; practical exercise, tests	60.0%	40.0%	
	Written examination	60.0%	60.0%	

Recommended reading	Basic literature	<p>1. J. D. Caserio, M. C. Roberts CHEMIA ORGANICZNA, PWN Warszawa, 1969</p> <p>2. R. T. Morrison, R. N. Boyd CHEMIA ORGANICZNA, PWN Warszawa, 1997</p> <p>3. J. McMurry CHEMIA ORGANICZNA, PWN Warszawa, 2017</p>
	Supplementary literature	<p>1. J. Gawroński, K. Gawrońska, K. Kacprzak, M. Kwit WSPÓŁCZESNA SYNTEZA ORGANICZNA, PWN Warszawa 2004</p> <p>2. J. March CHEMIA ORGANICZNA - Reakcje, mechanizmy, budowa, WNT Warszawa 1975</p> <p>3. H. O. House NOWOCZESNE REAKCJE SYNTEZY ORGANICZNEJ, PWN Warszawa 1979</p> <p>4. T. W. G. Solomons ORGANIC CHEMISTRY - 6th ed, John Wiley & Sons, Inc. New York, 1996</p>
	eResources addresses	<p>Adresy na platformie eNauczanie:</p> <p>2023/24 Chemia Organiczna BT - Moodle ID: 33543</p> <p>https://enauczanie.pg.edu.pl/moodle/course/view.php?id=33543</p>
Example issues/ example questions/ tasks being completed	<p>1. Give the product and mechanism of the reaction of benzene and AlCl_3 with a) an acyl chloride $\text{CH}_3\text{CH}_2\text{COCl}$; b) an acid anhydride $(\text{CH}_3\text{CH}_2\text{CO})_2\text{O}$. What is the electrophile? Show contributing resonance structures. How can we use the acylation to synthesize unbranched alkyl side chains on an aromatic ring? Illustrate by preparing n-propylbenzene.</p>	
Work placement	Not applicable	

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