



## Subject card

Subject name and code	Organic chemistry, PG_00054692						
Field of study	Biotechnology						
Date of commencement of studies	October 2023	Academic year of realisation of subject			2024/2025		
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	3	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	prof. dr hab. inż. Maria Milewska					
	Teachers	prof. dr hab. inż. Maria Milewska					
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	15.0	0.0	0.0	0.0	45
	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	45	5.0		25.0	75	
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			[SU2] Assessment of ability to analyse information		
	K6_W03	The student has knowledge of 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	<p><b>Introduction</b></p> <p>Chemical bonds and properties of molecules. Character of chemical bonds. Description of covalent bond. Structure of methane, ethane and ethyne hybridization <math>sp^3</math>, <math>sp^2</math> and <math>sp</math>. Polarized covalent bonds; electronegativity, dipole moment. Intermolecular interactions. Lewis structures, formal charge, resonance. Classification of organic compounds IUPAC nomenclature of organic compounds. Acids and bases in organic chemistry (theory Brønsted-Lowry, Lewis, Pearson)</p> <p><b>Alkanes and cycloalkanes</b> constitutive and geometric isomerism.</p> <p>IUPAC nomenclature, homologs, physical properties. Conformational analysis of alkanes and cycloalkanes. Alkane and cycloalkane syntheses. Chemical reactions of alkanes - chain radical reactions.</p> <p><b>Alkyl halides</b></p> <p>Stereoisomers chiral molecules, enantiomers and diastereomers, configuration, CIP rules, racemates, reactions leading to diastereomers. Structure, nomenclature and preparation of alkyl halides. Nucleophilic substitution and elimination reaction mechanisms and stereochemistry, carbocations: stability and stereochemistry.</p> <p><b>Alkenes and alkynes</b></p> <p>Nomenclature, electronic structure, stereochemistry, synthesis and chemical properties, carbocation rearrangements, ionic and radical addition to multiple bonds, regioselectivity, stereospecificity, hydroxymercuration and hydroboration of alkenes, polymerization, epoxidation, oxidation and ozonolysis, allylic substitution.</p> <p><b>Hydroxycompounds</b></p> <p>Classification and nomenclature of alcohols and phenols. Properties of alcohols acidity and basicity, hydrogen bond forming.</p> <p><b>Ethers, epoxides</b></p> <p>Ethers structure and nomenclature. Ethers as solvents. Epoxides and their reactions. Epoxide resins and glues. Crown ethers.</p>		
Prerequisites and co-requisites	Structure of elements and their compounds, especially carbon; acids, bases and salts; reaction types, geometry of molecules		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Midterm colloquium	60.0%	70.0%
	Practical exercise, tests	60.0%	30.0%
Recommended reading	<p>Basic literature</p> <ol style="list-style-type: none"> <li>1. J. D. Caserio, M. C. Roberts CHEMIA ORGANICZNA, PWN Warszawa, 1969</li> <li>2. R. T. Morrison, R. N. Boyd CHEMIA ORGANICZNA, PWN Warszawa, 1997</li> <li>3. J. McMurry CHEMIA ORGANICZNA, PWN Warszawa, 2017</li> </ol>		

	Supplementary literature	<p>1. J. Gawroński, K. Gawrońska, K. Kacprzak, M. Kwit WSPÓŁCZESNA SYNTEZA ORGANICZNA, WN 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 &amp; Sons, Inc. New York, 1996</p>
	eResources addresses	Adresy na platformie eNauczanie:
Example issues/ example questions/ tasks being completed	<p>1. Butter Yellow [<i>N,N</i>-dimethyl-4-(phenyldiazenyl)aniline] is a dye once used to color margarine. It has since been shown to be carcinogenic and its use in food is no longer permitted. Outline a synthesis of Butter Yellow from benzene and <i>N,N</i>-dimethylaniline.</p> <p>2. Outline two methods for preparing isopropyl methyl ether by a Williamson synthesis. One method gives a much better yield of the ether than the other. Explain which is the better method and why.</p>	
Work placement	Not applicable	