



## Subject card

Subject name and code	Organic chemistry, PG_00035963						
Field of study	Chemical Technology						
Date of commencement of studies	October 2022		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	2		Language of instruction		Polish		
Semester of study	3		ECTS credits		4.0		
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  dr hab. Sławomir Makowiec				
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						
	Additional information: The mark is <b>one</b> and only after meeting both conditions (passing the exercises, and lecture tests, and exam), 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	45		5.0		50.0	100
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_W02		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		
	K6_U03		Student is able to predict the potential biological properties of biomolecules and organic compounds based on knowledge of their chemical structure		[SU3] Assessment of ability to use knowledge gained from the subject		

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 sp<sup>3</sup>, sp<sup>2</sup> and sp. Polarized covalent bonds; electronegativity, dipol 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>Stereoizomers 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, stereospecifity, hydroxymercuration and hydroboration of alkenes, polimeryzation, epoxidation, oxidation and ozonolyais, allylic substitution.</p> <p><b>Hydroxycompounds</b></p> <p>Clasification 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	<table><tr><td>Subject passing criteria</td><td>Passing threshold</td><td>Percentage of the final grade</td></tr><tr><td>Practical excercise, tests</td><td>60.0%</td><td>30.0%</td></tr><tr><td>Midterm colloquium</td><td>60.0%</td><td>70.0%</td></tr></table>			Subject passing criteria	Passing threshold	Percentage of the final grade	Practical excercise, tests	60.0%	30.0%	Midterm colloquium	60.0%	70.0%
Subject passing criteria	Passing threshold	Percentage of the final grade										
Practical excercise, tests	60.0%	30.0%										
Midterm colloquium	60.0%	70.0%										
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, 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	<p>Adresy na platformie eNauczanie:</p> <p>2023/24 Chemia Organiczna BT - Moodle ID: 33543</p> <p><a href="https://enauczanie.pg.edu.pl/moodle/course/view.php?id=33543">https://enauczanie.pg.edu.pl/moodle/course/view.php?id=33543</a></p>
Example issues/ example questions/ tasks being completed	<p>1) Chloramphenicol is potent antibiotic, isolated from <i>Streptomyces venezuelae</i>, that is particularly effective against typhoid fever. It was the first naturally occurring substance shown to contain a nitro group (-NO<sub>2</sub>) attached to an aromatic ring. Both stereocenters in chloramphenicol are known to have the <i>R</i> configuration. Identify the two stereocenters and write a tree-dimensional formula for chloramphenicol.</p> <p><i>p</i>-O<sub>2</sub>N-C<sub>6</sub>H<sub>4</sub>-CHOH-CH(NHCOCHCl<sub>2</sub>)-CH<sub>2</sub>OH</p> <p>2) Squalene, an important intermediate in the biosynthesis of steroids., has the molecular formula C<sub>30</sub>H<sub>50</sub> and has no triple bonds. What is the index of hydrogen deficiency of squalene? Squalene undergoes catalytic hydrogenation to yield a compound with the molecular formula C<sub>30</sub>H<sub>62</sub>. How many double bonds does a molecule of squalene have? How many rings?</p>	
Work placement	Not applicable	