



Subject card

Subject name and code	ORGANIC CHEMISTRY, PG_00064391						
Field of study	Chemistry						
Date of commencement of studies	October 2024	Academic year of realisation of subject			2025/2026		
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			4.0		
Learning profile	general academic profile	Assessment form			assessment		
Conducting unit	Department of Organic Chemistry -> Faculty of Chemistry -> Faculties of Gdańsk University of Technology						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. inż. Teresa Olszewska				
	Teachers		dr hab. inż. Teresa Olszewska				
Lesson types	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						
	eNauczanie source addresses: Moodle ID: 4058 CHEMIA ORGANICZNA https://enauczanie.pg.edu.pl/2025/course/view.php?id=4058						
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		35.0	100
Subject objectives	The aim of the subject is to familiarize students with the basics of organic chemistry covering the structure, properties, reactions and reaction mechanisms of organic compounds.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K6_W04] identifies the conditions of chemical processes occurring in the analysed systems through the appropriate selection of methods to solve them, by taking into account the interdependence of the structure and properties of key materials in sustainable development technologies	A student has knowledge of the structure and properties of organic compounds discussed during the lectures and knows the basic reactions they undergo.	[SW1] Assessment of factual knowledge
	[K6_U01] gathers information from literature, databases and other sources, interpreting, critically evaluating, summarising, formulating and justifying opinions, independently analyses and produces technical drawings with the use of computer assistance	A student is able to propose a method of synthesis of a given organic compound starting from an appropriate substrate. In addition, the student is able to indicate the most and least energy-stable conformation of simple organic molecules and determine the configuration of a chiral molecule.	[SU1] Assessment of task fulfilment [SU3] Assessment of ability to use knowledge gained from the subject
	[K6_K03] is aware of the importance of caring for the quality and diligence of the tasks performed, being responsible for their consequences	A student is aware of the toxicity and danger associated with the use of substances that belong to the specific class of organic compounds. A student knows typical substitutes for harmful chemical solvents that are less toxic to the environment.	[SK2] Assessment of progress of work
	[K6_W02] classifies acquired information, assessing its usefulness in solving the posed problems concerning the synthesis and analysis of selected groups of compounds, determining their physical and chemical properties, making measurements and determining the parameters of chemical reactions and processes	A student knows the basic reaction mechanisms of the main organic compounds classes discussed during the lectures, understands the concepts of stereospecific reaction, kinetic, and thermodynamic reaction control.	[SW1] Assessment of factual knowledge
Subject contents	<p>Course content – lecture</p> <p>Introductory information - chemical bonds, writing chemical formulas, resonance method, molecular geometry prediction, atomic and molecular orbitals, hybridization, constitutional isomerism, condensed and dashed structural formulas.</p> <p>Saturated hydrocarbons - nomenclature, homologous series, physical properties, conformational analysis of alkanes and cycloalkanes, chemical reactions of alkanes, synthesis of alkanes and cycloalkanes.</p> <p>Alcohols and alkyl halides - nomenclature, acid and basic properties, transformation of alcohols into alkyl halides, alkanes halogenation reaction and its mechanism, activation energy, radical chain reactions, reaction selectivity, nucleophilic substitution and elimination reactions - mechanisms and stereochemistry, stability of carbocations.</p> <p>Alkenes - nomenclature, electronic structure, stereochemistry, synthesis and chemical properties, rearrangement of carbocations, ion and radical addition reactions to multiple bonds, regioselectivity, stereospecificity, hydroxylation and hydroboration of alkenes, polymerization, oxidation and ozonolysis, substitution in the allylic position.</p> <p>Stereoisomers - geometric isomers, chiral molecules, enantiomers and diastereomers, configuration, CIP rules, racemic mixtures, reactions leading to diastereomers. Dienes and polyenes - properties of conjugated unsaturated systems, resonance method - further information, reactions of conjugated dienes, kinetic and thermodynamic control, Diels-Alder reaction.</p> <hr/> <p>Course content – exercises</p> <p>Designing multi-step pathways for the synthesis of organic molecules with a given structure from a given substrate.</p> <p>Applying/utilizing known reaction mechanisms to explain chemical transformations based on the structure of the substrate, product, and reagent molecules.</p> <p>Comparing the relative reactivity of molecules belonging to the same class of organic compounds based on their structures. Determining the configuration of molecules containing an asymmetric center.</p> <p>Determining the conditions for conducting reactions based on the knowledge of the physicochemical properties of particular classes of organic compounds.</p>		

Prerequisites and co-requisites	The basic knowledge of the structure of elements and their compounds, in particular elements of groups I-II and IV-VI of the periodic table.		
	The basic knowledge of the concept of acids, bases and salts; the types of chemical reactions and the geometry of some simple molecules.		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	tutorials - tests on the material carried out during the classes	60.0%	50.0%
	lecture - two tests based on lecture material	60.0%	50.0%
Recommended reading	Basic literature	1) J. McMurry CHEMIA ORGANICZNA, PWN Warszawa, 2002 2) R. T. Morrison, R. N. Boyd CHEMIA ORGANICZNA, PWN Warszawa, 1997 3) J. D. Caserio, M. C. Roberts CHEMIA ORGANICZNA, PWN Warszawa, 1969 4) T. W. G. Solomons ORGANIC CHEMISTRY - 6th ed, John Wiley & Sons, Inc. New York, 1996 5) F. A. Carey ORGANIC CHEMISTRY 4th ed, Mc Graw Hill Companies, Inc. USA, 2000	
	Supplementary literature	1) J. Gawroński, K. Gawrońska, K. Kacprzak, M. Kwit WSPÓŁCZESNA SYNTEZA ORGANICZNA, WN PWN Warszawa 2004 2) J. March CHEMIA ORGANICZNA - Reakcje, mechanizmy, budowa, WNT Warszawa 1975 3) H. O. House NOWOCZESNE REAKCJE SYNTEZY ORGANICZNEJ, PWN Warszawa 1979	
	eResources addresses		

<p>Example issues/ example questions/ tasks being completed</p>	<p>1) Acid-catalyzed dehydration of neopentyl alcohol, $(\text{CH}_3)_3\text{CCH}_2\text{OH}$, yields 2-methyl-2-butene as the major product. Outline a mechanism showing all steps in its formation.</p> <p>2) Outline all steps in a synthesis of propyne from each of the following:</p> <p>a) CH_3COCH_3</p> <p>b) $\text{CH}_3\text{CH}_2\text{CHBr}_2$</p> <p>c) $\text{CH}_3\text{CHBrCH}_2\text{Br}$</p> <p>d) $\text{CH}_3\text{CH}=\text{CH}_2$</p> <p>3) Write structural formulas for the products that form when 1-butene reacts with each of the following reagents:</p> <p>a) HBr in the presence of peroxides</p> <p>b) Br_2 in CCl_4, then KI in acetone</p> <p>c) cold concentrated H_2SO_4</p> <p>d) Br_2 in H_2O</p> <p>e) O_3, then Zn, H_2O</p> <p>4) Describe with equations a simple chemical test that you could use to distinguish between the members of following pairs of compounds. (In each case tell what the visible result would be.)</p> <p>a) pentane and 1-pentyne</p> <p>b) pentane and 1-pentanol</p> <p>c) 2-pentyne and 1-pentyne</p>
<p>Practical activities within the subject</p>	<p>Not applicable</p>

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