GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Organic Chemistry, PG_00037380		
Field of study	Chemistry		
Date of commencement of studies	October 2020	Academic year of realisation of subject	2021/2022
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		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Teresa Olszewska	
	Teachers	dr hab. inż. Teresa Olszewska	

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

Address on the e-learning platform: https://enauczanie.pg.edu.pl/moodle/course/view.php?id=4641
Adresy na platformie eNauczanie:
2021/2022 Chemia Organiczna, kierunek Chemia, semestr IV - Moodle ID: 23576
https://enauczanie.pg.edu.pl/moodle/course/view.php?id=23576

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

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_U01] knows how to get information from literature, databases and other sources, can integrate the information obtained, interpret and critically evaluate it, and draw conclusions, and to formulate and justify the opinions	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 with a chiral center.	[SU1] Assessment of task fulfilment
K6_W02	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_W03	A student knows the basic reaction mechanisms of main organic compounds classes discussed during the lectures, understands the concepts of streospecific reaction; kinetic and thermodynamic reaction control.	[SW1] Assessment of factual knowledge
[K6_W09] has knowledge on chemical management and the concept of sustainable development necessary to conduct the management of chemicals (including dangerous substances) in the industrial plant, knows health and safety issues and ergonomics.	A student knows the toxicity and danger associated with the use of specific substances from the class of organic compounds in question. He knows typical substitutes for harmful chemical solvents for less toxic to the environment.	[SW1] Assessment of factual knowledge

Subject contents

Introductory information - chemical bonds, writing chemical formulas, resonance method, molecular geometry prediction, atomic and molecular orbitals, hybridization, constitutional isomerism, condensed and dashed structural formulas.

Saturated hydrocarbons - nomenclature, homologous series, physical properties, conformational analysis of alkanes
and cycloalkanes, chemical reactions of alkanes, synthesis of alkanes and cycloalkanes.

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.

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.

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.

Prerequisites and co-requisites

The basic knowledge of the structure of elements and their compounds, in particular elements of groups I, II and III 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	2021/2022 Chemia Organiczna, kierunek Chemia, semestr IV - Moodle ID: 23576 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=23576

Example issues/ example questions/ tasks being completed	1) Acid-catalyzed dehydration of neopentyl alcohol, $(CH_3)CCH_2OH$, yields 2-methyl-2-butene as the major product. Outline a mechanism showing all steps in its formation. 2) Outline all steps in a synthesis of propyne from each of the following: a) CH_3COCH_3 b) $CH_3CH_2CHBr_2$ c) $CH_3CHBrCH_2Br$ d) $CH_3CH=CH_2$ 3) Write structural formulas for the products that form when 1-butene reacts with each of the following reagents: a) HBr in the presence of peroxides b) Br_2 in CCl_4, then KI in acetone c) cold concentrated H_2SO_4 d) Br_2 in H_2O e) O_3, then Zn, H_2O 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.) a) pentane and 1-pentyne b) pentane and 1-pentanol c) 2-pentyne and 1-pentyne
Work placement	Not applicable