University of Gdańsk

Subject card

Subject name and code	Organic chemistry, PG_00144381		
Field of study	Chemistry		
Date of commencement of studies	October 2024	Academic year of realisation of subject	2025/2026
Education level	Bachelor's studies	Subject group	Obligatory subject group 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	academic	Assessment form	exam
Conducting unit	Faculty of Chemistry -> Rector		
Name and surname of lecturer (lecturers)	Subject supervisor	prof. dr hab. Beata Liberek	
	Teachers	prof. dr hab. Beata Liberek	

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	30.0	0.0	0.0	0.0	0.0	30

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	30	5.0	40.0	75

Subject objectives

Familiarizing students with the basic types of organic compounds, ways of writing their structures and predicting their spatial structure; developing the ability to plan a series of subsequent reactions leading to a specific product; introducing students to the possibilities of predicting the behavior of bifunctional compounds; developing the ability to independently experiment and solve problems when conducting a chemical experiment; familiarizing students with both the toxicity and medicinal properties of selected organic compounds.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[CHEML3_K06] Raises her/his professional and personal competences by using information provided in various sources.	Understands the need to improve qualifications and skills using various sources.	[SK8] observation of student's independent or team work
[CHEML3_U07] Prepares documented elaboration on a specific problem in the field of selected chemical and physical issues.	He carefully observes the experiment, keeping up-to-date laboratory notes; predicts, verifies and criticizes the results experiments.	[SU3] text preparation/written work
[CHEML3_K05] Observes established procedures in laboratory work and is responsible for the safety of her/his and others' work.	Demonstrates responsibility when working with chemical reagents, creativity in independent and team work, follows established research procedures, and is careful when dealing with hazardous substances.	[SK8] observation of student's independent or team work
[CHEML3_W01] Enumerates basic laws and theories in chemistry, physics, mathematics and biology.	Formulates and defines laws and concepts in the field of organic chemistry.	[SW4] test/exam - oral or written
[CHEML3_U03] Selects the appropriate equipment and laboratory apparatus for conducting uncomplicated chemical experiments.	Recognizes basic laboratory equipment and uses it to carry out tests chemical experiments.	[SU6] demonstration of practical skills
[CHEML3_U08] Presents in an understandable way the basic facts about chemistry using a scientific language typical of chemical sciences.	Can use correct chemical language to describe chemical facts and processes.	[SU4] test/exam - oral or written
[CHEML3_U09] Is able to learn independently.	Is able to independently search for available materials, absorb their content and then use the acquired information.	[SU8] observation of student's independent or team work
[CHEML3_W02] Describes the properties of elements and the most important chemical compounds, enumerates the methods of their preparation and methods of analysis.	Knows the properties of chemical elements and the most important groups of organic compounds. Knows how to obtain, extract and identify them.	[SW4] test/exam - oral or written

Subject contents

Chemical nomenclature, electronic structure of organic compounds, atomic and molecular orbitals, hybridization, isomerism (constitutional, stereoisomerism). Alkanes, cycloalkanes, alkenes, alkynes: preparation and reactivity. Radical substitution, addition to multiple bonds. Structure and stability of radicals and carbocations, rearrangement of carbocations. Conjugated dienes, resonance. Addition electrophilic to alkynes. Stereochemistry: chiral centers, enantiomers, diastereoisomers, meso compounds, racemic mixtures and their separation. Analysis conformational structure of ethane, butane, cyclohexane (axial and equatorial bonds), spatial patterns and Newman's formulas. Aromatic compounds. Criterion of aromaticity. Aromatic electrophilic substitution. Isomerism of polysubstituted aromatic compounds. Mechanism nucleophilic substitution of aromatic compounds. Polycyclic aromatic hydrocarbons. Alcohols, phenols, ethers and epoxides, synthesis and reactivity. Reactions with alkyl halides, dehydration, reactions with metals, oxidation, acylation. Nucleophilic substitution: Sn1 and Sn2. Elimination reactions: E1 and E2 - mechanism and stereochemistry. Aldehydes and ketones. Structure and properties of the carbonyl group. Nucleophilic addition of water, alcohols, amines and Grignard compounds to the carbonyl group. Aldol condensation, Cannizzaro reaction, Wittig reaction. Carboxylic acids and theirs derivatives. Synthesis of carboxylic acids and their reactivity. Esterification reactions, formation of acid halides, anhydrides, amides, etc. Substitution in the acyl group. Ketoenol tautomerism. The use of ethyl acetoacetate and diethyl malonate in organic synthesis. Reactions condensation, e.g. aldol, Claisen, Michael addition and similar reactions. Amines, basicity and nucleophilicity. Synthesis and reactions of amines. Relationships heterocyclic. Structure and nomenclature. Reactions with electrophilic and nucleophilic reagents, oxidation and reduction, acid-base properties.

Prerequisites and co-requisites

Knowledge of basic chemical laws and processes.

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Written exam.	50.0%	100.0%

Recommended reading

Basic literature	R. Morrison, R. Boyd - Organic chemistry, vol. 1-2. J. McMurry - Organic chemistry, vol. 1-5. L.G. Wade - Organic Chemistry.
Supplementary literature	No requirements.
eResources addresses	

Example issues/ example questions/ tasks being completed	Amine reactivity. How do nucleophilic addition reactions to the carbonyl group proceed when water, hydrazine and methanol are used as the second reagent? Justify the selection of the environment.
Work placement	Not applicable

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