University of Gdańsk

Subject card

Subject name and code	Stereochemistry of organic compounds, PG_00050724		
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	1.0
Learning profile	academic	Assessment form	credit
Conducting unit	Laboratory of Glycochemistry -> Department of Organic Chemistry -> Faculty of Chemistry -> Rector		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. Andrzej Nowacki	
	Teachers	dr hab. Andrzej Nowacki	

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	15.0	0.0	0.0	0.0	0.0	15

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	15	2.0	8.0	25

Subject objectives

- to familiarize students with basic and extended issues of spatial structure of organic compounds

- to familiarize students with the methods of obtaining and identifying stereoisomers

- to introduce students to issues concerning the use of stereochemical knowledge in planning syntheses

Learning outcomes

Course outcome	Subject outcome	Method of verification
[CHEML3_U01] Identifies, analyses and solves problems in the field of broadly understood chemistry on the basis of the acquired knowledge.	Student assigns molecules of organic compounds to symmetry groups; determines the configuration around the center, axis, plane of chirality; recognizes prochiral centers in organic compounds and is able to assign appropriate configuration descriptors to them; performs simple calculations of optical purity and enantiomeric excess; can distinguish racemic varieties on the basis of physicochemical data; can predict the stability of conformational isomers. Knows the basic routes of enantioselective synthesis	[SU4] test/exam - oral or written
[CHEML3_U08] Presents in an understandable way the basic facts about chemistry using a scientific language typical of chemical sciences.	Students define and use basic and expanded concepts of stereochemistry; know systems for determining the configuration of chirality elements in organic compounds; know methods for obtaining pure stereoisomers; know issues related to diastereo- and enantioselective synthesis; know issues related to the stability of stereoisomers, know issues related to spectropolarimetry.	[SU4] test/exam - oral or written
[CHEML3_W03] Explains the relationship between the structure of matter and its observed properties.	Student, based on acquired knowledge, is able to relate the structure of a stereoisomer to its properties	[SW4] test/exam - oral or written
[CHEML3_U09] Is able to learn independently.	Student independently completes/ expands knowledge based on the proposed primary literature	[SU4] test/exam - oral or written

Subject contents

Architecture of the molecule, basic issues and concepts related to stereochemistry. The nature of spatial isomers. Symmetry of organic molecules. Configuration: relative and absolute, methods of determining relative and absolute configuration. Properties of stereoisomers and their differentiation, racemates, racemization; biological properties of stereoisomers. Separation of stereoisomers. Prostereoisomerism and prochirality. Stereochemistry of alkenes: nature of cis-trans isomerism, determination of configuration of cis-trans isomers. Conformation of chain molecules. Ring molecules - conformation and configuration. Conformation versus reactivity. Coupled and bridged polycyclic molecules. Chiralooptic methods: optical activity, ORD, CD, applications of ORD and CD (determination of configuration and conformation). Other sources of chirality: allenes, helicenes; biphenyls, helicenes, molecules with planar chirality. Stereoselective and stereospecific synthesis: diastereoselective synthesis, enantioselective synthesis.

Prerequisites and co-requisites

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Passing grade, passing score on written exam consisting of 10-20 open questions	51.0%	100.0%

Recommended reading

Basic literature	M. Nogradi - Stereochemistry, fundamentals and applications, PWN, Warsaw 1988.E. L. Eliel, S. W. Wilen, L. N. Mander Stereochemistry of organic compounds, Wiley & Sons, New York 1994 K. Mislow Introduction to stereochemistry, Dover Publications, New York 2006D. G. Morris - Stereochemistry, PWN, Warsaw 2008.J. Gawroński, K. Gawrońska - Stereochemistry in organic synthesis, PWN, Warsaw 1988
Supplementary literature	K. Mislow Introduction to stereochemistry, Dover Publications, New York 2006D. G. Morris Stereochemia, PWN, Warszawa 2008J. Gawroński, K. Gawrońska Stereochemia w syntezie organicznej, PWN, Warszawa 1988
eResources addresses	

Example issues/ example questions/ tasks being completed	1 Define the terms:(a) chirality (two definitions)(b) diastereoisomer(c) meso compound(d) van der Waals radius2. what product will be formed (R or S) if 3-bromo-1-chloropentane-2-one is treated with LiAlH4 (reduction to alcohol) from the Re side? Write down the corresponding reaction equation.3. Draw in Newman projection two alternating conformations of 2-fluoroethanol (F-CH2-CH2-OH), projecting along the C-C bond. Name these conformations, give the approximate value and sign of the torsional angle, and mark the more stable one.4 List three methods for determining relative configurations. Briefly characterize one of them.5. Describe, using appropriate examples, the behavior of enantiomers and diastereoisomers in environments: (a) achiral,(b) chiral.
Work placement	Not applicable

Document generated electronically. Does not require a seal or signature.