University of Gdańsk

Subject card

Subject name and code	Organic reactions mechanisms, PG_00179586						
Field of study	Chemistry						
Date of commencement of studies	October 2026		Academic year of realisation of subject	2027/2028			
Education level	Master's studies		Subject group	Optional 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	4		ECTS credits	2.0			
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	prof. dr hab. Beata Liberek					
	Teachers						
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		15.0		10.0	55
Subject objectives	To extend the basic organic chemistry course towards acquiring the ability to predict, formulate and verify reaction mechanisms in organic chemistry.						

Learning outcomes

Course outcome	Subject outcome	Method of verification
[CHEMMU2_W04] Applies the acquired knowledge to an in-depth description of the properties of chemical connections, methods of their synthesis and analysis.	Based on the mechanism, predicts the products of the reaction; discusses the possibilities of the reaction taking place.	[SW1] oral statement/ conversation/discussion [SW5] implementation of a problem task
[CHEMMU2_W11] Demonstrates general knowledge about the current trends in the development of chemistry as a science and the latest discoveries in this field.	Proposes a mechanism for the transformations described in the chemical literature.	[SW1] oral statement/ conversation/discussion [SW5] implementation of a problem task
[CHEMMU2_U04] Applies acquired knowledge of chemistry and related scientific disciplines.	Associates compound structure and reaction conditions with possible reaction mechanisms.	[SU1] oral statement/conversation/ discussion [SU8] observation of student's independent or team work
[CHEMMU2_K04] Correctly identifies and resolves dilemmas related to the profession of a chemist.	Defines the general types of mechanisms by which organic compounds react; associates compound structure and reaction conditions with possible reaction mechanisms.	[SK1] oral statement/conversation/ discussion [SK8] observation of student's independent or team work
[CHEMMU2_U02] Critically assesses the results of conducted, performed observations and theoretical calculations and discusses errors.	Demonstrates creativity; understands the need for different elements of a project to work together; remains critical.	[SU1] oral statement/conversation/ discussion [SU8] observation of student's independent or team work
[CHEMMU2_U03] Finds necessary information in specialist literature, databases and other sources, lists basic scientific journals in chemistry.	Understands the need to look at a problem comprehensively; discusses different approaches to a problem.	[SU1] oral statement/conversation/ discussion [SU8] observation of student's independent or team work
[CHEMMU2_K01] Knows the limitations of her/his own knowledge; understands the need for further education and can inspire other people to do so.	Maintains criticality; appreciates the constituent elements of acquired knowledge.	[SK1] oral statement/conversation/ discussion [SK8] observation of student's independent or team work
[CHEMMU2_W05] Has extended knowledge in the field of the specialisation studied.	Explains how ionic reactions differ from radical and pericyclic reactions, nucleophilic reactions from electrophilic reactions; orders reaction intermediates in terms of stability; assigns a specific reaction mechanism to specific substrates; describes the individual steps in the mechanisms learned with diagrams.	[SW1] oral statement/ conversation/discussion
[CHEMMU2_K03] Understands the need for systematic work on various projects of a long-term nature and knows how to set priorities for the implementation of undertaken tasks.	Understands the need to look at a problem comprehensively; discusses different approaches to a mechanism problem; demonstrates creativity.	[SK1] oral statement/conversation/ discussion [SK8] observation of student's independent or team work

Subject contents

Mechanism types; reaction intermediates; nucleophilic substitution on sp3 carbon: SN2, SN1, SNi, SN2', SN1', mixed mechanisms, adjacent group participation; nucleophilic substitution on sp2 carbon: SN on carbonyl, vinyl, aromatic carbon; electrophilic substitution: aromatic, SE2, SEi, SE1, with double bond shift; free radical substitution; electrophilic addition: to C=C double bond, in conjugated system, to CC triple bond; nucleophilic addition: to a carbonyl group, to a carbon-heteroatom bond, to a C=C double bond in a conjugated system; free radical addition to a C=C double bond; elimination reactions; rearrangements: nucleophilic, electrophilic, free radical, via a cyclic transition state, rearrangements with a change in ring size; pericyclic reactions: electrocyclic, cycloaddition, sigmatropic rearrangements.

Prerequisites and co-requisites

Knowledge of the basic groups of organic compounds, their structure and chemical properties; knowledge of the fundamentals of kinetics and thermodynamics of chemical reactions.

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
active participation in classes	87.0%	100.0%

Recommended reading

Basic literature	M. B. Smith, J. March *Marchs Advanced Organic Chemistry* *J. Clayden, N. Greeves, S. Warren, P. Wothers Organic Chemistry*
Supplementary literature	P. Y. Bruice *Organic Chemistry*
eResources addresses	

Example issues/ example questions/ tasks being completed

Propose mechanisms for the following transformations: here a drawing.

Work placement	Not applicable

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