


KAPITAŁ LUDZKI
 NARODOWA STRATEGIA SPÓJNOŚCI

 Projekt współfinansowany przez
 Unię Europejską w ramach
 Europejskiego Funduszu
 Społecznego

UNIA EUROPEJSKA
 EUROPEJSKI
 FUNDUSZ SPOŁECZNY


Course title		ECTS code	
Basic mechanisms in organic chemistry		13.3.1367	
Name of unit administrating study			
null			
Studies			
faculty	field of study	type	pierwszego stopnia
Wydział Chemii	Biznes chemiczny	form	stacjonarne
		specjalty	wszystkie
		specialization	wszystkie
Wydział Chemii	Chemia	type	pierwszego stopnia
		form	stacjonarne
		specjalty	chemia biomedyczna, chemia kosmetyków, analityka i diagnostyka chemiczna, chemia żywności
Wydział Chemii	Ochrona środowiska	specialization	wszystkie
		type	pierwszego stopnia
		form	stacjonarne
		specjalty	wszystkie
		specialization	wszystkie
Teaching staff			
dr hab. Aneta Szymańska, profesor uczelni; dr Marta Spodzieja; dr hab. Magdalena Wysocka, profesor uczelni; dr hab. Elżbieta Jankowska, profesor uczelni; dr Ewa Wieczerzak; dr Maria Dzierżyńska			
Forms of classes, the realization and number of hours		ECTS credits	
Forms of classes		6	
Auditorium classes, Lecture		Estimated working time:	
The realization of activities		Hours with the participation of the academic teacher	
classroom instruction		participation in lectures 30 h	
Number of hours		participation in seminar 15 h	
Auditorium classes: 15 hours, Lecture: 30 hours		consultations 15 h	
		exam 2 h	
		Hours without the participation of the academic teacher	
		preparation for the exam 23 h	
		preparation for the test 20 h	
		homework 15 h	
		Total 120 h - 6 ECTS	
The academic cycle			
2025/2026 summer semester			
Type of course		Language of instruction	
an elective course		English	
Teaching methods		Form and method of assessment and basic criteria for evaluation or examination requirements	
<ul style="list-style-type: none"> - Lecture with multimedia presentation of basic issues of organic chemistry - discussion with the teacher, solving of the practical problems connected to the material discussed during the lectures, homework evaluation - group work - multimedia-based lecture - problem solving 		Final evaluation	
		Graded credit	
		Assessment methods	
		<ul style="list-style-type: none"> - written exam with open questions - (mid-term / end-term) test - graded course credit based on individual grades obtained during the semester 	

The basic criteria for evaluation

Lecture:

- Obtaining at least 51% of the total number of points from the written exam, consisting of open questions, regarding mechanisms of selected reactions in organic chemistry, in accordance with the content discussed during the course

A student is entitled to one retake of the exam in the case he/she failed at the first term.

The retake exam is considered passed when the student obtains at least 51% of the total number of points. Points from the basic exam and retake exam do not add up.

Assessment criteria in accordance with the University of Gdańsk Study Regulations.

Seminar:

- Obtaining at least 51% of the total number of points from each of the tests consisting of questions on the mechanisms of organic reactions, in accordance with the content discussed in the course.

The student is entitled to one retake of each filed test. The retake test is considered passed when the student scores at least 51% of the total number of points. The points from the test in the first term and the retake test do not add up. Assessment criteria in accordance with the University of Gdańsk Study Regulations.

Method of verifying required learning outcomes**Required courses and introductory requirements****A. Formal requirements**

Completed courses – general chemistry and basic organic chemistry

B. Prerequisites

Knowledge and practical use of chemical terminology and nomenclature.

Aims of education

Familiarizing students with:

- basic mechanisms of organic reactions, both ionic and radical;
- information on reactive intermediates in organic chemistry;
- information on the basic types of reactions: substitution, elimination and addition in saturated and unsaturated systems;
- rules for drawing the reaction mechanism and predicting the product based on the nature of the intermediate;
- rules for designing simple synthesis schemes leading to the given/planned compound

Course contents

- Introduction to the writing of the mechanisms of reactions in organic chemistry;
- Reactive intermediates in organic chemistry: carbocations, carboanions, radicals and carbenes (structure, stability and methods of formation);
- Mono- and bimolecular nucleophilic substitution (SN1 and SN2) and elimination reactions (E1 and E2) in aliphatic system (nucleophile vs. base, leaving group, transition state, stereochemistry, solvent effect, rearrangements);
- Nucleophilic substitution in aromatic system (addition-elimination and benzyne mechanisms);
- Nucleophilic substitution and addition in acyl group (reactions of aldehydes, ketones and carboxylic acid derivatives, similarities and differences);
- Electrophilic addition to unsaturated systems (alkenes, alkynes, dienes) – regio- and stereoselectivity, rearrangements;
- Electrophilic aromatic substitution of benzene and substituted benzene derivatives (halogenation, sulfonation, nitration, Friedel-Crafts acylation and alkylation), mechanisms, substituent effects upon rate and regioselectivity;
- Reactions of enols and enolates (enolate formation by deprotonation, regioselectivity of deprotonation, aldol condensation, including intramolecular and crossed versions, Claisen condensations and similar reactions, enolate alkylation);
- Designing of simple reaction schemes;
- Retrosynthesis.

Bibliography of literature

Literature required to pass the course

- Sykes, P.: A guidebook to mechanism in organic chemistry, Longman Scientific and Technical
- Wade Jr., L.G.: Organic Chemistry, Pearson
- Hornback, J.M.: Organic chemistry, Thomson Brooks/Cole
- Hart, H.; Craine, L.E.; Hart, D.J.: Organic Chemistry, Brooks/Cole, Cengage Learning

Extracurricular readings

- monographic materials provided by the teacher

The learning outcomes (for the field of study and specialization)

Chemical Business:

Student:

K_BCh_W02: enumerates laws and theories in chemistry,

Knowledge

Student enumerates laws and theories in chemistry necessary to solve a given problem, uses proper chemical nomenclature and distinguishes different types of reactions in organic chemistry. Explains the relationships between the structure of

<p>physics and mathematics necessary to formulate and solve simple engineering tasks</p> <p>K_BCh_U08: uses the chemical nomenclature and engineering terminology properly</p> <p>K_BCh_U09: using the acquired knowledge, skills and various sources of scientific information independently prepares written papers and oral presentations</p> <p>K_BCh_K01: identifies the level of her/his own knowledge and skills as well as the need to update engineering knowledge, continuous professional training and personal development</p> <p>K_BCh_K02: works individually demonstrating initiative and independence in actions, and effectively cooperates in a team, performing various roles in it</p> <p>Chemistry: Student</p> <p>K_W01: enumerates laws and theories in chemistry, physics, mathematics and biology</p> <p>K_W02: describes at an advanced level the properties of elements and the most important chemical compounds, enumerates the methods of their preparation and methods of analysis</p> <p>K_W03: explains at an advanced level the relationship between the structure of matter and its observed properties</p> <p>K_U01: identifies, analyses and solves problems in the field of broadly understood chemistry on the basis of the acquired knowledge</p> <p>K_U07: prepares documented elaboration on a specific problem in the field of selected chemical and physical issues</p> <p>K_U09: is able to learn independently</p> <p>K_K01: identifies the level of her/his own knowledge and skills and the need for continuous learning and personal development</p> <p>K_K02: works individually demonstrating initiative and independence of activity and cooperates in a team fulfilling various roles in it</p> <p>K_K06: raises her/his professional and personal competences by using information provided in various sources</p>	<p>an organic compound and methods of obtaining it.</p> <p>Skills</p> <p>Student recognizes and selects the right chemical reactions to necessary to plan the synthesis of a given organic compound. Prepares written elaboration on a selected problem and presents it to other. Analyzes the results and makes conclusions based on them</p> <p>Social competence</p> <p>Student is able to establish and implement a specific action plan by setting priorities for its implementation. He/she can determine his/her level of knowledge and skills and understands the need for continuous learning and personal development. He/she understands the importance of self-education and improving his/her competences</p>
<p>Contact</p> <p>aneta.szymanska@ug.edu.pl</p>	