


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 mechanizms in organic chemistry		13.3.1201	
Name of unit administrating study			
null			
Studies			
faculty	field of study	type	first tier studies (BA)
Faculty of Chemistry	Chemical Business	form	full-time
		specialty	all
		specialization	all
Faculty of Chemistry	Chemistry	type	first tier studies (BA)
		form	full-time
		specialty	all
Faculty of Chemistry	Environmental Protection	specialization	all
		type	first tier studies (BA)
		form	full-time
		specialty	all
		specialization	all
Teaching staff			
dr hab. Aneta Szymańska, profesor uczelni; dr Ewa Wieczerzak; dr Marta Spodzieja; dr Maria Dzierżyńska; dr hab. Elżbieta Jankowska, profesor uczelni; dr hab. Magdalena Wysocka, profesor uczelni			
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	
lectures in the classroom		participation in lectures 30 h	
Number of hours		participation in seminar 15 h	
Auditorium classes: 15 hours, Lecture: 30 hours		consultations 2 h	
		exam 2 h	
		Hours without the participation of the academic teacher	
		preparation for the exam 36 h	
		preparation for the test 24 h	
		homework 11 h	
		Total 120 h - 6 ECTS	
The academic cycle			
2023/2024 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 		Final evaluation	
		Graded credit	
		Assessment methods	
		<ul style="list-style-type: none"> - written exam with open questions - tests with practical problems to solve based on the acquired knowledge 	
		The basic criteria for evaluation	

Lecture:

- Achievement of at least 51 % of the total number of points from the written exam.

Seminar:

- Achievement of at least 51 % of the total number of points from each of the tests.

Student has the rights to one retake the failed exam / test. The retaken exam / test will be considered as passed when students achieves at least 51% of the total number of points from the retaken exam / test. Points from the first term and the retake do not sum up

Method of verifying required learning outcomes

Lecture:

- Answers to the questions covering the problems presented during the lectures

Seminar:

- attendance, active participation in the class
- correct answers to the questions and proper solving of the problems presented to the student during the tests

Required courses and introductory requirements**A. Formal requirements**

Completed course – General chemistry

B. Prerequisites

lack

Aims of education

To teach basic mechanisms of organic reactions of both ionic and radical nature including the information concerning the reactive intermediates in organic chemistry, basic types of reactions: substitution, elimination and addition in saturated and unsaturated systems; the rules of writing reaction mechanism; predicting the product based on the nature of the intermediate.

As a result of the course students will:

- gain the knowledge of the nature and relative stability (reactivity) of basic organic intermediates,
- recognize and name the basic types of organic reactions (substitution, elimination, addition)
- propose the type and mechanism of the reaction for the given substrates
- draw the basic mechanism of the reaction using proper arrows
- predict product(s) of the reaction, assign main and side-products
- explain the regio- and stereochemistry of the reaction
- design simple synthetic scheme leading to a given compound

Course contents

- 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)
- Writing the reaction mechanism
- Designing of simple reaction schemes

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

<p>The learning outcomes (for the field of study and specialization)</p> <p>Chemical Business: Student: K_BCh_W02: enumerates laws and theories in chemistry, physics and mathematics necessary to formulate and solve simple engineering tasks K_BCh_U08: uses the chemical nomenclature and engineering terminology properly K_BCh_U09: using the acquired knowledge, skills and various sources of scientific information independently prepares written papers and oral presentations 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 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 K_W01: enumerates laws and theories in chemistry, physics, mathematics and biology 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 K_W03: explains at an advanced level the relationship between the structure of matter and its observed properties K_U01: identifies, analyses and solves problems in the field of broadly understood chemistry on the basis of the acquired knowledge K_U07: prepares documented elaboration on a specific problem in the field of selected chemical and physical issues K_U09: is able to learn independently K_K01: identifies the level of her/his own knowledge and skills and the need for continuous learning and personal development K_K02: works individually demonstrating initiative and independence of activity and cooperates in a team fulfilling various roles in it K_K06: raises her/his professional and personal competences by using information provided in various sources</p>	<p>Knowledge</p> <p>Students enumerate laws and theories in chemistry necessary to solve a given problem, use proper chemical nomenclature and distinguish different types of reactions in organic chemistry. Explain the relationships between the structure of an organic compound and methods of obtaining it.</p> <p>Skills</p> <p>Students plan and select the right chemical reactions to plan the synthesis of a given organic compound. Prepare written elaboration on a selected problem and present it to other. Analyze the results and make conclusions based on them</p> <p>Social competence</p> <p>Students are able to establish or realize a defined action plan setting priorities for its implementation. Students are able to identify their level of knowledge and skills and understand the necessity of life-long learning in organic chemistry and personal development. Students understand the importance of self-learning and rising his/her competences</p>
<p>Contact</p> <p>aneta.szymanska@ug.edu.pl</p>	