


KAPITAŁ LUDZKI
 NARODOWA STRATEGIA SPÓJNOŚCI

 Projekt współfinansowany przez
 Unię Europejską w ramach
 Europejskiego Funduszu
 Społecznego

UNIA EUROPEJSKA
 EUROPEJSKI
 FUNDUSZ SPOŁECZNY


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|--|--------------------------|--|-------------------------|
| 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 hab. Elżbieta Jankowska, profesor uczelni; dr Maria Dzierżyńska; dr Marta Spodzieja; 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 | |
| classroom instruction | | 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 | | | |
| 2024/2025 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**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

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

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

Knowledge

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.

Skills

Students plan and select the right chemical reactions to plan the synthesis of a

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| <p>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>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.</p> <p>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.</p> <p>Students understand the importance of self-learning and rising his/her competences</p> |

Contact

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