COURSE DESCRIPTION CARD - SYLLABUS

Course name
Organic chemistry [S1IChiP1>CO]

Course

Field of study
Chemical and Process Engineering

Year/Semester
2/3

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
Polish

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
45

Laboratory classes
30

Other
0

Tutorials
30

Projects/seminars
0

Number of credit points

5,00

Coordinators

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Lecturers

Prerequisites

The student has a basic knowledge of general and organic chemistry at the level of general education school. The student is able to solve the simple problem tasks of organic chemistry based on his knowledge. The student is aware of the need to broaden his knowledge.

Course objective

1. Provide students with basic knowledge of organic chemistry, to the extent specified by the content of the curriculum of the chemical and process engineering field of study. 2. Develop students" ability to solve basic problems in the synthesis of simple organic compounds and the problems related to the reactivity of compounds containing various functional groups. 3. Develop students" awareness of the responsibility for their future decisions relevant to the chemical engineer work.

Course-related learning outcomes

Knowledge:
1. the student has ordered, theoretically founded general knowledge in the field of organic chemistry; the student knows the issues related to the theory of orbitals and resonance, and characteristic reactions (including mechanisms) of major groups of organic compounds - [k_w03]

2. the student is able to plan the method of synthesis of simple organic compounds with different functional groups which may be used in chemical industry; the student is able to characterize the substrates needed and he is able to analyze the resulting products - [k_w09]
3. the student knows the physical-chemical properties of different groups of organic compounds and is aware of the need to use appropriate precautions when using them in laboratory work; the student understands the need for neutralization and segregation of waste substances - [k_w08]

Skills:
1. the student is able to obtain information from the literature, electronic databases and other sources properly selected, he is able to interpret and draw conclusions, also practical - [k_u01]
2. the student has the ability to self-education - [k_u05]
3. the student knows the safety rules related to work in the chemical laboratory - [k_u12]

Social competences:
1. the student understands the need to improve his professional qualifications - [k_k01]
2. the student is aware of the importance of the decisions on the future of engineering activities, their comprehensive impact on the environment - [k_k02]
3. the student is able to work with full responsibility individually, and also is ready to work efficiently in a team, performing work-related tasks in the chemical laboratory - [k_k04]

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Learning outcomes presented above are verified as follows:
Lectures - Assessment of knowledge and skills on the basis of written and oral examination.
Exercises - Individual oral answer, written tests summarizing the material concerning the nomenclature, methods of synthesis and reactivity of important classes of organic compounds.
Laboratories - Written test or oral response before each exercise based on materials provided by the Laboratory teacher; evaluation of the implementation of synthesis of selected organic compounds as well as purification of the crude product, while maintaining the safety rules related to work in the chemical laboratory.

Programme content

Issues in organic chemistry relevant to chemical and process engineering.

Course topics

Introduction: the nomenclature and stereochemistry of organic compounds (IUPAC rules), the theory of orbitals, hybridization, chemical bonding, resonance, polarity of bonds and molecules.
The concept of acidity and basicity. Types of chemical reactions and mechanisms. Transition states, the formation of intermediate products. Kinetically and thermodynamically controlled reactions. Rearrangements. Tautomerism.
Methods of synthesis and reactivity of the major classes of organic compounds: alkanes, alkenes, alkynes, aromatic compounds, alkyl halides, organometallic compounds, alcohols and phenols, aldehydes and ketones, carboxylic acids and their derivatives, amines and nitro compounds.
Laboratory techniques used in organic synthesis. Performing several synthesis of simple organic compounds.
The safety rules associated with working in an organic chemistry laboratory. The Student knows the basic laboratory techniques and is able to carry out simple reactions of organic compounds.

Teaching methods

Lecture: multimedia presentation supplemented with extensive commentary and examples
Exercises: Solving problems related to naming, synthesis and properties of individual groups of organic compounds, learning how to write reaction mechanisms.
Laboratory: Performing several syntheses of organic compounds based on a preparative recipe

Bibliography

Basic

1. J. McMurry, Chemia organiczna, PWN, Warszawa 2017.
2. R.T. Morrison, R.N. Boyd, Chemia organiczna, PWN, Warszawa 1998.
3. A. Vogel, Preparatyka organiczna, WNT, Warszawa 2006.
5. D. Buza, A. Ćwil, Zadania z chemii organicznej z rozwiązaniami, Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 2003.
Additional
1. Przewodnik do nomenklatury związków organicznych, Polskie Towarzystwo Chemiczne, Warszawa 1994.
2. M. Mąkosza, M. Fedoryński, Podstawy syntezy organicznej. Reakcje jonowe i rodnikowe, Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 2006.
3. W. Majewski, Mechanizmy reakcji organicznych, Wydawnictwo Uniwersytetu Marii Curie-Skłodowskiej, Lublin 2012.

Breakdown of average student's workload

	Hours	ECTS
Total workload	145	5,00
Classes requiring direct contact with the teacher	105	0,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	40	0,00