

<b>Course title</b>	<b>Organic chemistry I</b>
<b>Course code</b>	<i>Ķīmi1008</i>
<b>Branch of science</b>	Chemistry
<b>Science sub-sector</b>	Organic Chemistry
<b>Credits</b>	4
<b>ECTS credits</b>	6
<b>The total audience hours</b>	64
<i>Number of lectures</i>	32
<i>Seminars and practical work hours</i>	8
<i>Laboratory works</i>	24
<i>Course work hours allotted number</i>	-

<b>Course developer(s)</b>
Dr. chem., doc. Jeļena Kirilova

<b>Preliminary knowledge (course title, part of the program where the course to learn)</b>
Ķīmi1006, General and Inorganic Chemistry

<b>Course summary:</b>
<p>Aim of the course: To develop students' active and creative attitude to learning, providing a solid foundation of organic chemistry for understanding the diversity and interrelationships of organic substances, its physical and chemical properties and practical application possibilities. Practical research skills and abilities are developed during laboratory works.</p> <p>Course objectives: 1) to introduce students to the basic principles of organic compounds nomenclature and theoretical problems of organic chemistry;  2) to develop an understanding of chemical transformations of organic molecules;  3) to acquire the laboratory work techniques in organic chemistry laboratory.</p>

<b>Results:</b>
<p>Academic competences: A course to give an understanding of the most important properties of organic compounds, their interconnections and important fields of application, as well as basic skills in the characterization and preparation of organic substances.</p> <p>Professional competences: as a result of the course students acquire skills in the purification and isolation of organic compounds, in the implementation and application of learned research methods for the investigation of the main organic substances.</p>

<b>Course content:</b>
<p>General principles and history of organic chemistry. General structure of organic compounds. Organic radical and functional group. Classification of organic compounds. Isolation, purification and identification of organic compounds. Bond formation, inductive effect, mesomeric effect, resonance. Isomerism. Structural isomers. Classification of organic reactions. Structure and nomenclature of organic compounds. Hydrocarbons: alkanes, alkenes, alkadienes, alkynes, cycloalkanes, arenes. Its nomenclature, preparation methods, properties and uses. Halogen hydrocarbons: haloalkanes, haloalkenes, haloalkynes, haloarenes. Its isomerism, nomenclature, preparation methods, properties and uses. Organometallic compounds. Hydroxyl derivatives of hydrocarbons: saturated and unsaturated mono and polyalcohols, phenols. Its isomerism, nomenclature, preparation methods, properties and uses. Carbonyl derivatives of hydrocarbons: aldehydes and ketones.</p>

**Course plan:**

(Reflected in the course content, structure and calendar)

Course structure: Lectures - 32 h., Seminars - 8 hours. Laboratory works - 24 h.

**Lecture topics:**

1. General principles of organic chemistry.
2. History of organic chemistry.
3. Isolation, purification and identification of organic compounds. Bond formation, inductive effect, mesomeric effect, resonance.
4. Classification and nomenclature of organic compounds.
5. Organic radical and functional group. Isomerism. Structural isomers.
6. Classification of organic reactions and reagents
7. Hydrocarbons: alkanes, alkenes. Its nomenclature, preparation methods, properties and uses.
8. Hydrocarbons: alkadienes, alkynes. Its nomenclature, preparation methods, properties and uses.
9. Arenes. Its nomenclature, preparation methods, properties and uses.
10. Halogen hydrocarbons: haloalkanes, haloalkenes. Its isomerism, nomenclature, preparation methods, properties and uses.
11. Halogen hydrocarbons: haloalkynes, haloarenes. Its isomerism, nomenclature, preparation methods, properties and uses.
12. Organometallic compounds.
13. Hydroxyl derivatives of hydrocarbons: saturated and unsaturated mono alcohols. Its isomerism, nomenclature, preparation methods, properties and uses.
14. Hydroxyl derivatives of hydrocarbons: saturated and unsaturated polyalcohols. Its isomerism, nomenclature, preparation methods, properties and uses.
15. Hydroxyl derivatives of hydrocarbons: phenols. Its isomerism, nomenclature, preparation methods, properties and uses.
16. Carbonyl derivatives of hydrocarbons: aldehydes and ketones. Its isomerism, nomenclature, preparation methods, properties and uses.

**Seminar topics:**

1. Data of elemental analysis.
2. Nomenclature and properties of hydrocarbons and halogen hydrocarbons.
3. Properties of hydroxyl derivatives of hydrocarbons.
4. Properties of carbonyl derivatives of hydrocarbons.

**Laboratory work topics:**

1. Analysis of organic compounds: determination of C, H, Hal.
2. Purification of organic substances.
3. Detection of retention factor and melting point.
4. Extraction.
5. Distillation of organic compounds.
6. Vacuum distillation.
7. Properties of alkanes, alkenes, alkynes.
8. Properties of arenes.
9. Halogen hydrocarbons.
10. Alcohols.
11. Phenols.
12. Carbonyl compounds.

**Requirements for credits:**

Successful execution of laboratory work (20%), passed seminar (10%); Examination end of the course (70%)

**Basic training:**

1. **Klein, David.** Organic chemistry / David Klein. - Hoboken, N.J. : John Wiley, 2012.
2. **Carey, Francis A.** Advanced organic chemistry / Francis A. Carey and Richard J. Sundberg. - 5th ed. - New York : Springer, 2007.
3. **Baum, Stuart J.** Introduction to organic and biological chemistry / S. J. Baum, J. W. Hill. - New York : Macmillan Publishing Company, 1993.
4. **Bettelheim, Frederick.** Laboratory manual for general, organic & biochemistry / Frederick Bettelheim, Joseph Landesberg. - Fort Worth : Harcourt Brace Jovanovich College Publishers, 1991.

**Further reading:**

1. **R.T.Morrison, R.N. Boyd.** Organic Chemistry. Prentice Hall, Englewood Cliffs, New Jersey, 1992.
2. **Starkey, Laurie Shaffer.** Introduction to the strategies of organic synthesis / Laurie S. Starkey. - Hoboken, NJ : Wiley, 2012.
3. **Нейланд О. Я.** Органическая химия: Учебник для вузов / О.Я.Нейланд. - Москва: Высшая школа, 1990.
4. **Потапов В. М.** Органическая химия. - Москва : Просвещение, 1992.

**Periodicals and other information sources**

Journal of Organic Chemistry

**Remarks:****We identify programs and portions (A, B, C, D) belonging to this course is:**

BSP „Chemistry” part A

**Course title in English:**

Organic chemistry I

**Annotation in English:**

The course is intended for students of bachelor study programmes “Chemistry”. This course gives an introduction to organic chemistry, nomenclature and classification of organic compounds. The course is aimed to provide students with knowledge about physical and chemical properties of organic compounds and about their synthesis and functionality. Gained understanding of the principles and tools for analysis and characterization of organic compounds.