

UČNI NAČRT PREDMETA / COURSE SYLLABUS

Predmet: ORGANSKA KEMIJA 2
Course Title: ORGANIC CHEMISTRY 2

| Študijski program in stopnja Study Programme and Level | Študijska smer Study Field | Letnik Academic Year | Semester Semester |
|---|-------------------------------|-------------------------|----------------------|
| VSŠP Kemijska tehnologija, 1. stopnja | / | 2. | 3. |
| PSP Chemical Technology, 1 st Cycle | / | 2 nd | 3 rd |

Vrsta predmeta / Course Type:

obvezni / Mandatory

Univerzitetna koda predmeta / University Course Code:

KT113

| Predavanja Lectures | Seminar Seminar | Vaje Tutorial | Klinične vaje Work | Druge oblike študija | Samost. delo Individual Work | ECTS |
|------------------------|--------------------|------------------|-----------------------|----------------------|---------------------------------|------|
| 45 | 30 | / | / | / | 75 | 5 |

Nosilec predmeta / Lecturer:

prof. dr. Franc Požgan / Dr. Franc Požgan, Associate Professor

Jeziki / Languages:

Predavanja / Lectures: slovenski / Slovenian

Vaje / Tutorial: /

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:

Študent oz. kandidat mora imeti predmet opredeljen kot študijsko obveznost.

Prerequisites:

The course has to be assigned to the student.

Vsebina:

Aromatske spojine: nomenklatura, struktura benzena in njegova stabilnost, aromatičnost; elektrofilne aromatske substitucije; policiklične aromatski ogljikovodiki.
Aldehidi in ketoni: tipi karbonilnih spojin, nomenklatura, sinteza, pretvorbe in lastnosti aldehydov in ketonov; nukleofilne adicije na aldehide in ketone; kislost alfa vodikovih atomov, keto-enolna tautomerija, kondenzacijske reakcije.
Karboksilne kisline in derivati: nomenklatura, struktura, lastnosti in pretvorbe karboksilnih kislin in njihovih derivatov; najlon in poliestri.
Amini: nomenklatura, struktura in lastnosti aminov; bazičnost aminov, sinteza in pretvorbe.
Biomolekule.

Content (Syllabus outline):

Aromatic compounds: nomenclature, structure of benzene and its stability; electrophilic aromatic substitution reactions; polycyclic aromatic compounds.
 Aldehydes and ketones: kinds of carbonyls, nomenclature, synthesis, transformations and properties of aldehydes and ketones; nucleophilic additions; acidity of alpha hydrogen atoms, keto-enol tautomerism, condensation reactions.
 Carboxylic acids and derivatives: nomenclature, structure, properties and conversions of carboxylic acids and their derivatives; nylon and polyesters. Amines: nomenclature, structure and properties of amines; synthesis and

Ogljikovi hidrati: razdelitev, struktura, Fisherjeva projekcija, D- in L-monosaharidi; pretvorbe monosaharidov; disaharidi in polisaharidi.

Aminokislina, peptidi in beljakovine: nomenklatura, struktura in lastnosti aminokislin; peptidi in beljakovine, razdelitev beljakovin in njihova struktura.

Lipidi: razdelitev, nomenklatura; trigliceridi, masti in olja, mila in umetni detergenti; steroidi, holesterol.

Nukleinske kisline: uvod in sestavine.

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conversions. Biomolecules. Carbohydrates: classification, structure, Fischer projection, D- and L-monosaccharides; conversions of monosaccharides; disaccharides and polysaccharides. Amino acids, peptides and proteins: nomenclature, structure and properties of amino acids; peptides and proteins, classification of proteins and their structure. Lipids: classification, nomenclature; triglycerides, fats and oils, soaps and synthetic detergents; steroids, cholesterol. Nucleic acids: introduction and components.

Temeljna literatura in viri / Readings:

- J. McMurry: Fundamentals of Organic Chemistry, Brooks/Cole Publishing Company, 4th Edition, Pacific Grove 1998, 566 pages (50%).

Supplementary reading:

(a) P. W. Atkins, M. J. Frazer, M. J. Clugston, R. A. Y. Jones: Kemija, zakonitosti in uporaba (translated by A. Kornhauser, S. A. Glažar), Tehniška založba Slovenije d. d., Ljubljana, 1997.

(b) M. Tišler: Organska kemija, 3. popravljena in dopolnjena izdaja, Državna založba Slovenije, Ljubljana, 2005.

Cilji in kompetence:

Cilj predmeta je, da študent pridobi oz. poglobi: temeljno znanje iz organske kemije tj. poznavanje nomenklature organskih spojin, poznavanje posameznih vrst organskih spojin (po funkcionalnih skupinah) in njihovih strukturnih značilnosti ter reaktivnosti, poznavanje osnov organske stereokemije, reakcijskih mehanizmov in intermediatov, poznavanje osnovnih principov organske sinteze, poznavanje literaturnih virov in njihove uporabe.

Objectives and Competences:

Understanding of the basic principles of organic chemistry, i.e. knowledge of individual classes of organic compounds (by functional groups), their nomenclature, structural characteristics and reactivity. Knowledge of basis of organic stereochemistry, reaction mechanisms and intermediates, knowledge of basic principles of organic synthesis, knowledge of sources of chemical literature and their use.

Competences:

Ability to interpret structural characteristics of individual classes of organic compounds and to predict their reactivity on the basis of their structures. Ability to explain the fundamental organic reactions.

Predvideni študijski rezultati:

Znanje in razumevanje

Študent se nauči osnov organske kemije iz področja: karboksilnih spojin, aminov in biomolekul (ogljikovih hidratov, aminokislin, peptidov in beljakovin, lipidov in nukleinskih kislin) ter spozna literaturne vire in njihovo uporabo. V obliki

Intended Learning Outcomes:

Knowledge and Comprehension

Student understands and is familiar with organic chemistry subjects:

Carboxylic compounds

Amines and biomolecules (carbohydrates, amino acids, peptides, lipids, and nucleic acids)

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| seminarjev pa utrjuje tudi področja iz Organske kemije I. | Is familiar with literature sources and its use. By solving the theoretical problems they review the knowledge of Organic chemistry I |
| Uporaba Študent pridobi oz. utrdi temeljno znanje, ki je osnova za nadaljnji študij kemije in se navezuje na večino ostalih predmetov študija kemije. To znanje je nujno potrebno pri kasnejšem delu v praksi. | Application Mastered knowledge of organic chemistry is basic knowledge needed for studying Chemical technology. The knowledge is interconnected with majority of other subjects concerning the program. Course is also fundamental for understanding analytical chemistry subjects and courses concerning organic materials and ecology. |
| Refleksija Zavedanje, da je za popolno razjasnitev kemijske reakcije potreben natančen študij vsake reakcijske stopnje. | Analysis Student is capable of recognising different types of organic compounds, predict their physical properties, toxicity, reactivity, etc. |
| Prenosljive spretnosti Pri predmetu se študenti z reševanjem različnih problemov izurijo v uporabi znanja, analitičnega razmišljanja in uporabe literaturnih virov. | Skill-transference Ability The student acquires skills that are required for a basic synthetic laboratory work and for handling with chemicals. The knowledge on organic chemistry enables better understanding of the basic principles of other subjects and courses within the study. |

Metode poučevanja in učenja:

Predavanja; seminarji, individualni in skupinski projekti.

Learning and Teaching Methods:

Lectures, seminar work, training by analytical solving of the theoretical problems.

Delež (v %) /

Načini ocenjevanja:

Pisni izpit (nadomestita ga lahko dva pozitivno ocenjena kolokvija).

Weight (in %) **Assessment:**

Written exam. Written exam can be passed by two positive partial exams

Reference nosilca / Lecturer's references:

1. ŠTEFANE, Bogdan, PERDIH, Franc, VIŠNJEVAC, Aleksander, POŽGAN, Franc. Novel triazole-based ligands and their zinc(II) and nickel(II) complexes with a nitrogen donor environment as potential structural models for mononuclear active sites. *New journal of chemistry*, ISSN 1144-0546, no. 1, 2015, str. 566-575, ilustr. <http://pubs.rsc.org/en/content/articlepdf/2014/nj/c4nj01642d?page=search>, doi: [10.1039/c4nj01642d](https://doi.org/10.1039/c4nj01642d). [COBISS.SI-ID [1536036291](https://www.cobiss.si/id/1536036291)]
2. WAGGER, Jernej, POŽES, Aljaž, POŽGAN, Franc. Synthesis of European pharmacopoeial impurities A, B, C, and D of cabergoline. *RSC advances*, ISSN 2046-2069, 2013, vol. 3, no. 45, str. 23146-23156, ilustr. <http://pubs.rsc.org/en/content/articlepdf/2013/ra/c3ra43417f>, doi: [10.1039/c3ra43417f](https://doi.org/10.1039/c3ra43417f). [COBISS.SI-ID [1646639](https://www.cobiss.si/id/1646639)]
3. POŽGAN, Franc, DIXNEUF, Pierre H. Ruthenium(II) acetate catalyst for direct functionalisation of sp²-C-H bonds with aryl chlorides and access to tris- heterocyclic molecules. *Advanced Synthesis & Catalysis*, ISSN 1615-4150. [Print ed.], 2009, vol. 351, no. 11/12, str. 1737-1743, doi: [10.1002/adsc.200900350](https://doi.org/10.1002/adsc.200900350). [COBISS.SI-ID [30712837](https://www.cobiss.si/id/30712837)]