



Univerza v Mariboru

Fakulteta za naravoslovje
in matematiko

UČNI NAČRT PREDMETA / COURSE SYLLABUS

| | |
|----------------------|------------------|
| Predmet: | Kemija |
| Course title: | Chemistry |

| Študijski program in stopnja Study programme and level | Študijska smer Study field | Letnik Academic year | Semester Semester |
|--|-------------------------------|----------------------------|-----------------------|
| Univerzitetni študijski program Fizika, 1. stopnja | | 2. 2 nd | 3. 3 rd |
| Undergraduate university Programme Physics, 1.st. degree | | | |

Vrsta predmeta / Course type

Univerzitetna koda predmeta / University course code:

| Predavanja Lectures | Seminar Seminar | Vaje Tutorial | Lab. vaje Laboratory work | Terenske vaje Field work | Samost. delo Individ. work | ECTS |
|------------------------|--------------------|------------------|---------------------------------|--------------------------------|----------------------------------|------|
| 45 | | | 15 | | 60 | 4 |

Nosilec predmeta / Lecturer:

Jeziki / Predavanja / Lectures:
Languages: Vaje / Tutorial:

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

Vsebina: Content (Syllabus outline):

Najprej so obravnavani osnovni pojmi in zakonitosti splošne kemije, v drugem delu predmeta pa je več povedano o organski kemiji in kemiji procesov v okolju. Prvi del vključuje:

- izgradnja periodnega sistema (aufbau princip)
- tipi vezi med atomi
- stehiometrija, kemijska nomenklatura
- kemijsko ravnotežje
- redoks reakcije
- kislost in bazičnost, pH, pufr

V drugem sklopu pa je poudarek na naslednjih poglavjih:

- tipi organskih spojin, izomerija, stereokemija,
- biološko pomembne organske spojine: aminokisliline, ogljikovi hidrati, lipidi
- organski polutanti

Firstly, basic principles and laws of general chemistry are discussed, in the continuation of the course the emphasis will be on organic chemistry and on the chemistry of environmental processes. The first part includes:

- Aufbau principle and the periodic table of elements
- Bonds between atoms
- Stoichiometry, Nomenclature
- Chemical equilibrium
- Redox reactions
- Acidity, pH, buffers

In the continuation the emphasis is on the following:

- Types of organic compounds, isomerism, stereochemistry
- Biologically important organic compounds: amino acids, carbohydrates, lipids
- Organic pollutants

Temeljni literatura in viri / Readings:

- Andrews J. E. P. Brimblecombe, T. Djickells, P. S. Liss, B. J. Reid, 2003: An Introduction to Environmental Chemistry, Blackwell Science (UK).
- Lazarini, F., J. Brenčič, 1984: Splošna in anorganska kemija, DZS, Ljubljana.
- K. P. C. Vollhardt, N. E. Schore, 1999: Organic Chemistry, W. H. Freeman and Company, New York

Cilji in kompetence:

- Podati pregled splošne kemije
- Razložiti strukturne vplive spojin na reaktivnost in spreminjanje okolja
- Predstaviti kemizem najpogostejših onesnažil (polutantov)

Objectives and competences:

- To give the overview of general chemistry
- To explain the structural influences of compounds on the environment.
- To present the chemistry of the most common pollutants.

Predvideni študijski rezultati:

Znanje in razumevanje:

- Povezovanje atomov v spojine
- Razumevanje osnovnih kemijskih procesov preoblikovanja molekul
- Razumevanje vplivov strukture spojine na reaktivnost

Intended learning outcomes:

Knowledge and understanding:

- Molecule building
- Basic concepts of chemical reactions
- Understanding of structure – reactivity relationships

- Razumevanje povezanosti kemijskih ciklusov okolja
- Prenesljive/ključne spretnosti in drugi atributi:**
- Prepoznavanje spojin v okolju in njihovega pomena
 - Poznavanje in predvidevanje vpliva sintetičnih spojin na okolje

Metode poučevanja in učenja:

- Predavanja
- Laboratorijske vaje

- Understanding of environmental elemental cycles
- Transferable/Key Skills and other attributes:**
- Recognition of compounds in the environment and their impact.
 - Prediction of the influence of synthetic compounds on the environment

Learning and teaching methods:

- Lectures
- Laboratory work

| Načini ocenjevanja: | Delež (v %) / Weight (in %) | Assessment: |
|---|--------------------------------|---|
| <ul style="list-style-type: none"> • Kolokvij iz vaj • Pisni izpit <p>Opravljenе laboratorijske vaje in pozitivna ocena kolokvija sta pogoja za pristop k izpitu.</p> | <p>25</p> <p>75</p> | <ul style="list-style-type: none"> • Partial exam of laboratory exercises • Written exam <p>Laboratory exercises and positive grade of partial exam are required for taking the written exam.</p> |

Reference nosilca / Lecturer's references:

1. HOJNIK, Nuša, KRISTL, Matjaž, GOLOBIČ, Amalija, JAGLIČIĆ, Zvonko, DROFENIK, Mihael. Hydrolytic synthesis of novel lanthanide(III) complexes with pyridine-2,6-dicarboxylic acid. *Journal of molecular structure*, ISSN 0022-2860. [Print ed.], 5 Jan. 2015, vol. 1079, str. 54-60, ilustr., doi: [10.1016/j.molstruc.2014.09.029](https://doi.org/10.1016/j.molstruc.2014.09.029). [COBISS.SI-ID [18148118](#)]
2. KRISTL, Matjaž, KRISTL, Janja. Sonochemical process for the preparation of nanosized copper selenides with deifferent phases. *Chalcogenide letters*, ISSN 1584-8663. [Online ed.], Feb. 2014, vol. 11, no. 2, str. 59-66. www.chalcogen.ro/59_Kristl.pdf. [COBISS.SI-ID [17586198](#)]
3. KRISTL, Matjaž, DOJER, Brina, HOJNIK, Nuša, GOLOBIČ, Amalija. Synthesis and characterization of new hydroxylammonium fluoromanganates and fluoroscandates. *Journal of fluorine chemistry*, ISSN 0022-1139. [Print ed.], Sep. 2014, vol. 166, str. 15-21, doi: [10.1016/j.jfluchem.2014.07.006](https://doi.org/10.1016/j.jfluchem.2014.07.006). [COBISS.SI-ID [18000662](#)]
4. KRISTL, Matjaž, BAN, Irena, GYERGYEK, Sašo. Preparation of nanosized copper and cadmium chalcogenides by mechanochemical synthesis. *Materials and manufacturing processes*, ISSN 1042-6914, 2013, vol. 28, iss. 9, str. 1009-1013, ilustr., doi: [10.1080/10426914.2013.811736](https://doi.org/10.1080/10426914.2013.811736). [COBISS.SI-ID [17184278](#)]
5. KRISTL, Matjaž, HOJNIK, Nuša, GYERGYEK, Sašo, DROFENIK, Mihael. Sonochemical preparation of copper sulfides with different phases in aqueous solutions. *Materials research bulletin*, ISSN 0025-5408. [Print ed.], Mar. 2013, vol. 48, iss. 3, str. 1184-1188, doi: [10.1016/j.materresbull.2012.12.020](https://doi.org/10.1016/j.materresbull.2012.12.020). [COBISS.SI-ID [16676886](#)]