



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 Biologija, 1. stopnja		1. 1 st	1. 1 st
Undergraduate university Programme Biology, 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			30		105	6

Nosilec predmeta / Lecturer:

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

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

Vsebina:
Content (Syllabus outline):

V prvem delu so obravnavane osnovne zakonitosti in zakoni splošne kemije:

- Lastnosti snovi, kemijske formule in enačba, osnove stehiometrije
- Plinski zakoni, idealno in neidealno obnašanje plinov
- Struktura atomov, periodni sistem elementov
- Kemijske vezi in njihove lastnosti
- Raztopine, solvatacija, koncentracije raztopin, topnost
- Kisline, baze, pH, pufri

Poudarek drugega dela je na osnovah anorganske kemije, vključno z osnovami anorganske nomenklature:

- Vodik, kisik, voda
- Elementi VII. skupine: F, Cl, Br, I
- Elementi VI. skupine: S
- Elementi V. skupine: N, P
- Elementi IV. Skupine: C, Pb
- Elementi I.– III. skupine: Na, K, Ca, Mg, Al

Tretji del je namenjen osnovam organske kemije in nomenklature:

- Alkani, alkeni, alkini, izomerija
- Aromatske spojine
- Organske kisline
- Alkoholi, ogljikovi hidrati
- Etri, estri, lipidi
- Aminokisline, peptidi, proteini

In the first part, basic principles and laws of general chemistry are discussed:

- Properties of matter, chemical formulas and equations, basics of stoichiometry
- Gas laws, ideal and non-ideal behaviour of gasses
- Structure of atoms, periodic table of elements
- Chemical bonds and their properties
- Solutions, solvation, concentration of solutions, solubility
- Acids, bases, pH, buffer solutions

The emphasis of the second part is on the basics of inorganic chemistry, including basic inorganic nomenclature:

- Hydrogen, oxygen, water
- Group VII elements: F, Cl, Br, I
- Group VI elements: S
- Group V elements: N, P
- Group IV elements: C, Pb
- Group I – III elements: Na, K, Ca, Mg, Al

The third part is devoted to basic organic chemistry and organic nomenclature:

- Alkanes, alkenes, alkynes, isomerism
- Aromatic compounds
- Organic acids
- Alcohols, carbohydrates
- Ethers, esters, lipids
- Amino acids, peptides, proteins

Temeljni literatura in viri / Readings:

- F. Lazarini, J. Brenčič, Splošna in anorganska kemija, DZS Ljubljana (1992)
- P.W. Atkins, Kemija - zakonitosti in uporaba, TZS Ljubljana (1995)
- J. Kristl, Organska kemija (Urejeni zapiski predavanj), Univerzitetna založba UM (2017)
- M. Kristl, B. Dojer, Zbirka računskih nalog pri predmetu Kemija, FNM UM (2015)

Cilji in kompetence:

- Kandidat bo seznanjen z osnovnimi pojmi splošne, anorganske in organske kemije

Objectives and competences:

- The candidate will get acquainted with the basic conception of general, inorganic and organic chemistry

- Kandidat bo razumel vplive strukture spojin na njihove lastnosti in reaktivnost
- Kandidat bo spoznal kemizem najpomembnejših elementov in spojin prisotnih v vsakdanjem življenju, v okolju, laboratoriju in kemijski industriji

- The candidate will understand the influences of the structure of compounds on their properties and reactivity
- The candidate will know the chemistry of the most important elements and compounds in the environment, chemical laboratory and industry

Predvideni študijski rezultati:

Znanje in razumevanje:

Študent je sposoben prepoznati osnovne principe splošne, anorganske in organske kemije. Zna opisati pridobivanje, lastnosti in glavne spojine izbranih reprezentativnih elementov, s poudarkom na spojinah z vodikom in kisikom. Obvlada osnove kemijskega računanja na osnovi kemijskih enačb. Zna navesti in razložiti periodične lastnosti elementov po periodnem sistemu. Zna opredeliti pomen okoljskih ciklov nekaterih elementov.

Prenesljive/ključne spretnosti in drugi atributi:

Študent je sposoben uporabiti osnovno kemijsko znanje potrebno za sodelovanje pri predmetih ki zahtevajo kemijsko predznanje. Prepoznava elemente in spojine v okolju in njihov vpliv. Študent prepozna in opredeli vpliv sintetičnih spojin na okolje.

Metode poučevanja in učenja:

- Predavanja
- Laboratorijske vaje

Intended learning outcomes:

Knowledge and understanding:

The student is able to recognize basic principles of general, inorganic and organic chemistry. He/she is able to describe the production, properties and main compounds of selected main group elements, with the focus on hydrogen and oxygen compounds. He/she is able to perform basic calculations using chemical equations. He/she is able to state and explain the periodicity of element properties throughout the periodic table. The student is able to define the importance of environmental elemental cycles.

Transferable/Key Skills and other attributes:

The student is able to use elementary chemical knowledge needed for attending other courses where chemical prerequisites are required. He/she is able to recognize elements and compounds in the environment and their impact. The student recognizes and defines 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>40</p> <p>60</p>	<ul style="list-style-type: none"> • Partial exam of laboratory exercises • Written exam
Opravljene laboratorijske vaje in pozitivna ocena kolokvija sta pogoja za pristop k izpitu.		Laboratory exercises and positive grade of partial exam are required for taking the written exam.

Reference nosilca / Lecturer's references:

1. DOJER, Brina, GOLOBIČ, Amalija, BABIČ, Nejc, JAGLIČIĆ, Zvonko, KRISTL, Matjaž. Iron(II) pyridinecarboxamide complexes : synthesis, crystal structures and magnetic properties. *Journal of molecular structure*. [Print ed.]. Oct. 2022, vol. 1265, str. 1-9. ISSN 0022-2860. DOI: [10.1016/j.molstruc.2022.133393](https://doi.org/10.1016/j.molstruc.2022.133393). [COBISS.SI-ID [110985475](#)], [JCR, SNIP, WoS, Scopus]
2. KRISTL, Matjaž, BAN, Irena, GYERGYEK, Sašo, MAVER, Uroš, STERGAR, Janja. Sol-gel preparation of Ni_xCu_{1-x}/silica nanocomposites using different silica precursors. *Journal of sol-gel science and technology*. 2022, vol. 101, str. 579-587. ISSN 0928-0707. DOI: [10.1007/s10971-020-05321-z](https://doi.org/10.1007/s10971-020-05321-z). [COBISS.SI-ID [20266755](#)], [JCR, SNIP, WoS, Scopus]
3. KRISTL, Matjaž, GYERGYEK, Sašo, ŠKAPIN, Srečo D., KRISTL, Janja. Solvent-free mechanochemical synthesis and characterization of nickel tellurides with various stoichiometries: NiTe, NiTe₂ and Ni₂Te₃. *Nanomaterials*. [Online ed.]. 29 July 2021, vol. 11, iss. 8, str. 1-14, ilustr. ISSN 2079-4991. DOI: [10.3390/nano11081959](https://doi.org/10.3390/nano11081959). [COBISS.SI-ID [72057603](#)]
4. KRISTL, Matjaž, SINANOVIĆ, Nermin, GYERGYEK, Sašo, KRISTL, Janja. Sonochemical synthesis, characterization and photocatalytic activity of Bi₂Mo₃O₁₂. *Inorganic chemistry communications*. [Print ed.]. Feb. 2020, vol. 112, str. 1-5. ISSN 1387-7003. DOI: [10.1016/j.inoche.2019.107699](https://doi.org/10.1016/j.inoche.2019.107699). [COBISS.SI-ID [22858262](#)]
5. KRISTL, Matjaž, BAN, Irena, GYERGYEK, Sašo, MAVER, Uroš, STERGAR, Janja. Sol-gel preparation of Ni_xCu_{1-x}/silica nanocomposites using different silica precursors. *Journal of sol-gel science and technology*. Published 18 June 2020, str. [1-9]. ISSN 0928-0707. DOI: [10.1007/s10971-020-05321-z](https://doi.org/10.1007/s10971-020-05321-z). [COBISS.SI-ID [20266755](#)]