



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

Obvezni/Obligatory

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:

Matjaž Kristl

Jeziki /

Predavanja / Lectures:

slovenski / slovene

Languages:

Vaje / Tutorial:

slovenski / slovene

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

Ni pogojev za vključitev v delo.

Opravljene laboratorijske vaje in pozitivna ocena kolokvija sta pogoja za pristop k izpitu.

Prerequisites:

There are no prerequisites to enter the course.

Laboratory exercises and positive grade of midterm exam are required for taking the written exam.

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
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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)
- M. Kristl, B. Dojer, Zbirka računskih nalog pri predmetu Kemija, FNM UM (2015)

Dodatna literatura / Additional Readings:

- J. Kristl, Organska kemija (Urejeni zapiski predavanj), Univerzitetna založba UM (2017)

Cilji in kompetence:

Objectives and competences:

- Kandidat bo seznanjen z osnovnimi pojmi splošne, anorganske in organske kemije
- 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 get acquainted with the basic conception of general, inorganic and organic chemistry
- 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:

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 the influence of synthetic compounds on the environment.

Learning and teaching methods:

- Predavanja
- Laboratorijske vaje

- Lectures
- Laboratory work

Načini ocenjevanja:		Delež (v %) / Weight (in %)	Assessment:
• Kolokvij • Pisni izpit		40	• Midterm exam • Written exam
		60	

Reference nosilca / Lecturer's references:

- GOLOBIČ, Amalija, DOJER, Brina, JAGODIČ, Marko, SIHER, Anja, PEGAN, Anže, KRISTL, Matjaž. Synthesis and characterization of new copper(II) coordination compounds with methylammonium cations. *Inorganics*. 2024, vol. 12, iss. 10, [article no.] 261, 17 str. ISSN 2304-6740. <https://doi.org/10.3390/inorganics12100261>, DOI: [10.3390/inorganics12100261](https://doi.org/10.3390/inorganics12100261). [COBISS.SI-ID [211137027](https://doi.org/10.3390/inorganics12100261)]
- VOHL, Sabina, KRISTL, Matjaž, STERGAR, Janja. Harnessing magnetic nanoparticles for the effective removal of micro- and nanoplastics : a critical review. *Nanomaterials*. [Online ed.]. July 2024, vol. 14, no. 14, [art. no.] 1179, 39 str. ISSN 2079-4991. <https://dk.um.si/IzpisGradiva.php?id=89573>, DOI: [10.3390/nano14141179](https://doi.org/10.3390/nano14141179). [COBISS.SI-ID [202478851](https://doi.org/10.3390/nano14141179)]
- KRISTL, Matjaž, OSTROŠKO, Urška, BAN, Irena, PETRINIĆ, Irena, STERGAR, Janja. Thermal study of APTES-functionalized magnetite nanoparticles with citric acid and polyacrylic acid for advanced forward osmosis systems. *Journal of thermal analysis and calorimetry*. [Online ed.]. Published: 15 March 2024, 15 str., ilustr. ISSN 1588-2926. <https://dk.um.si/IzpisGradiva.php?id=89851>, DOI: [10.1007/s10973-024-12983-2](https://doi.org/10.1007/s10973-024-12983-2). [COBISS.SI-ID [189345283](https://doi.org/10.1007/s10973-024-12983-2)]
- DOJER, Brina, KRISTL, Matjaž, ŠORGO, Andrej. The comparison of the speed of solving chemistry calculation tasks in the traditional way and with the use of ICT. *Acta chimica slovenica*. [Spletna izd.]. 2023, vol. 70, no. 4, str. 690-698, ilustr. ISSN 1580-3155. <https://acsi-journal.eu/index.php/ACSi/article/view/8485/10061>, DOI: [10.17344/acsi.2023.8485](https://doi.org/10.17344/acsi.2023.8485), DOI: [20.500.12556/DKUM-88286](https://doi.org/20.500.12556/DKUM-88286). [COBISS.SI-ID [178350339](https://doi.org/20.500.12556/DKUM-88286)]
- KRISTL, Matjaž, ŠTURM, Jaka, GOLOBIČ, Amalija, JAGLIČIĆ, Zvonko, DOJER, Brina. New copper(II) complexes with hydroxypyridines: Synthesis, structural, thermal, and magnetic properties. *Inorganica Chimica Acta*. [Print ed.]. Oct. 2023, vol. 556, 10 str. ISSN 0020-1693. DOI: [10.1016/j.ica.2023.121670](https://doi.org/10.1016/j.ica.2023.121670). [COBISS.SI-ID [157729283](https://doi.org/10.1016/j.ica.2023.121670)]