



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
Fizika, 1. stopnja		2.	3.
Physics, 1st cycle		2 nd	3 rd

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			15		60	4

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.

Opravljenе 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

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:

- 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

Objectives and competences:

- 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:**

Poznavanje osnovnih principov splošne, anorganske in organske kemije. Poznavanje pridobivanja, lastnosti in glavnih spojin izbranih reprezentativnih elementov, s poudarkom na spojinah z vodikom in kisikom. Obvladovanje osnovnega kemijskega računanja na osnovi kemijskih enačb. Razumevanje periodičnih lastnosti elementov po periodnem sistemu. Razumevanja okoljskih ciklov nekaterih elementov.

Prenesljive/ključne spretnosti in drugi atributi:

Pridobitev osnovnega kemijskega znanja potrebnega za sodelovanje pri predmetih ki zahtevajo kemijsko predznanje. Prepoznavanje elementov in spojin v okolju in njihovega vpliva. Poznavanje in predvidevanje vpliva sintetičnih spojin na okolje.

Intended learning outcomes:**Knowledge and understanding:**

Knowledge about basic principles of general, inorganic and organic chemistry. Production, properties and main compounds of selected main group elements, with the focus on hydrogen and oxygen compounds. Performing basic calculations based on chemical equations. Understanding of periodicity of element properties throughout the periodic table. Understanding of environmental elemental cycles.

Transferable/Key Skills and other attributes:

Acquirement of elementary chemical knowledge needed for attending other courses where chemical prerequisites are required. Recognition of elements and compounds in the environment and their impact. Knowledge and prediction of the influence of synthetic compounds on the environment.

Metode poučevanja in učenja:

- Predavanja
- Laboratorijske vaje

Learning and teaching methods:

- Lectures
- Laboratory work

Načini ocenjevanja:	Delež (v %) / Weight (in %)	Assessment:
• Kolokvij	25	• midterm exam
• Pisni izpit	75	• Written exam

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, PETRINIČ, 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, JAGLIČIČ, 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)]