



Univerza v Mariboru

Fakulteta za naravoslovje
in matematiko

UČNI NAČRT PREDMETA / COURSE SYLLABUS

Predmet:	Splošna kemija
Course title:	General Chemistry

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Enovit magistrski študijski program druge stopnje Predmetni učitelj	/	1.	Zimski Autumn
Five-year master's degree program Subject Teacher	/		

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		180	10

Nosilec predmeta / Lecturer:

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

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

Vsebina:

Predmet zajema osnove splošne kemije

- **Snovi** (lastnosti snovi, zakonitosti kemijskih sprememb)
- **Materija v plinskem stanju** (plinski zakoni, idealni in realni plin, utekočinjenje plinov)
- **Termokemija** (prvi in drugi zakon termodinamike, entalpija, entropija, mrežna energija)
- **Periodni sistem** (periodni sistem elementov, elektronska zgradba atoma, elektronegativnost)
- **Vezi med atomi** (kemijske vezi in njihove lastnosti)
- **Raztopine** (topnost, hidratacija, koloidne raztopine, koligativne lastnosti)
- **Elektrokemija** (redoks reakcije, redoks)

Content (Syllabus outline):

The subject comprises the elementary principles of chemistry

- **Matter** (properties of matter, chemical formulas and equations)
- **Gases** (the gas laws, ideal and nonideal behavior of gases, liquid gases)
- **Thermochemistry** (first and the second law of thermodynamics, enthalpy, entropy, lattice energy)
- **Periodic properties** (the periodic system of elements, periodicity of electronic structure, electronegativity)
- **Chemical bonding** (chemical bonds and their properties)
- **Solutions** (solubility, hydration, colloidal)

<p>potenciali, galvanski členi, elektroliza, korozija)</p> <ul style="list-style-type: none"> • Žlahtni plini in van der Waalsove vezi(pridobivanje in lastnosti žlahtnih plinov, inermolekularne sile) • Kemijsko ravnotežje in zakon o vplivu mas (kisline in baze, disociacija šibkih kislin in baz, ionski produkt, definicija pH, hidroliza, puferji) • Koordinacijske spojine • Zgradba kristalov <p>Laboratorijske vaje</p> <p>Formule kemijskih spojin, plinski zakoni, priprava raztopin, topnost, elektrolitska disociacija, kemijsko ravnotežje, topnostni produkt, reakcije - oksidacije in redukcija.</p>	<p>solutions, colligative properties of solutions)</p> <ul style="list-style-type: none"> • Electrochemistry (oxidation and reduction, electrical terms, galvanic cells) • Noble gas and van der Waals(acquiring of noble gases and their properties, intermolecular forces) • Ionic equilibrium (weak acids and weak bases, common ion effect, definition of pH, hydrolysis, buffer solution) • Coordination compounds • Structure of crystals <p>Laboratory work</p> <p>Chemical stoichiometry, the gas laws, preparation of solutions, solubility, electrolytic dissociation, chemical equilibrium, solubility product, oxidation-reduction reactions.</p>
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Temeljni literatura in viri / Readings:

<ul style="list-style-type: none"> • M. Drogenik, »Splošna in anorganska kemija«, Fakulteta za kemijo in kemijsko tehnologijo – Univerza v Mariboru (2013) • D. F. Shriver, P.W. Atkins, Inorganic Chemistry, Oxford-University Press, 5th Ed (2010) <p>Dodatna priporočena literatura:</p> <ul style="list-style-type: none"> • J. C. Kotz, P. M. Treichel, Jr., J. Townsend, D. Treichel, «Chemistry and Chemical Reactivity», Saunders College Publishing, Philadelphia (2014) • D. W. Oxtoby, H. B. Gillis, H. Nachtrieb, » Principles of Modern Chemistry «, Saunders College Publishing, Philadelphia (2003) • F. Lazarini in J. Brenčič: »Splošna in Anorganska kemija«, Založba FKKT, Ljubljana (2011)

Cilji in kompetence:

Kandidat bo seznanjen z osnovnimi pojmi splošne kemije, ki mu bodo omogočali obvladati osnovno kemijsko računanje potrebno za delo v kemijskih laboratorijih in pedagoškem procesu.

Objectives and competences:

The candidate will be acquainted with the basic concepts of general chemistry. The student acquire knowledge needed for chemical calculation during working in a chemical Lab and teaching process.

Predvideni študijski rezultati:

- Študent pozna in razume osnovne kemijske zakonitosti ter jih zna povezati z zgradbo in lastnostmi snovi in kemijskimi reakcijami.
- Študent je sposoben oceniti pomen osnovnih kemijskih zakonitosti in teoretičnega znanja za razlago eksperimentalnih dejstev in lastnosti snovi
- Študent zna poiskati podatke iz strokovne

Intended learning outcomes:

- Student knows and understands basic chemical principles and is able to relate them to the structure and properties of matter and chemical reactions.
- Student is able to asses the meaning of basic chemical principles and theoretical knowledge for an explanation of experimental facts and properties of compounds.

literature , podatke iz virov medmrežja zna kritično oceniti. Uporabljati zna strokovni jezik (pisno in ustno)

Prenesljive/ključne spretnosti in drugi atributi:

Študent bo znal uporabiti pridobljeno znanje za:

Pridobitev kemijskih znanj potrebno za razumevanje ostalih kemijskih predmetov (organska, analizna in fizikalna kemija)

Pridobitev splošnega kemijskega znanja za sodelovanje pri ostalih tehnoloških predmetih.

- Student is able to find data from professional literature and is able to critically evaluate the data from the internet. He/She is able to use professional language (written and spoken).

Transferable/Key Skills and other attributes:

The student will use the acquired knowledge in:

Acquirement of elementary chemical knowledge needed for attending other chemical courses (analytic, physical and organic chemistry) and chemical engineering courses.

Metode poučevanja in učenja:

Predavanja
Seminarske vaje
Uporaba predstavitev s Power Point-om
Uporaba interneta
Uporaba »virtualne« splošne kemije
Demonstracija najpomembnejših kemijskih eksperimentov

Learning and teaching methods:

Oral lectures
Desk exercises
Power-Point presentation
Use of internet
Use of Interactive General Chemistry
Demonstration of most important chemical experiments

Načini ocenjevanja:

Delež (v %) /

Assessment:

Weight (in %)

Pogoj za pristop k teoretičnemu delu izpita sta: opravljena dva delna pisna testa (vsak opravljen z najmanj 50 % možnih točk) oz. zaključni pisni test iz vaj (opravljen z najmanj 60% možnih točk), ki predstavljajo računski del izpita, ter v celoti opravljene laboratorijske vaje.

Izpit je opravljen, če so pozitivno opravljene

vse naslednje obveznosti:

- računski del izpita (vaje)
- teoretični del izpita

50 %
50%

Conditions to access to the the calculus part of exam are two partial written tests from laboratory course (each min. 50% of all possible points) or final test (min. 60% of all possible points) which represents the calculus part of exam and completely performed laboratory course.

Student has to pass successfully the following obligations:

- the calculus part of exam (lab course)
- the theoretical part of the exam

Reference nosilca / Lecturer's references:

- STERGAR, Janja, BAN, Irena, DROFENIK, Mihael, FERK, Gregor, MAKOVEC, Darko. Synthesis and characterization of silica-coated Cu_(1-x)Ni_x nanoparticles. IEEE trans. magn., 2012,

vol. 48, 1344-1347, doi: [10.1109/TMAG.2011.2173168](https://doi.org/10.1109/TMAG.2011.2173168)

- FERK, Gregor, BAN, Irena, STERGAR, Janja, MAKOVEC, Darko, HAMLER, Anton, JAGLIČIĆ, Zvonko, DROFENIK, Mihael. A facile route to the synthesis of coated maghemite nanocomposites for hyperthermia applications. *Acta chimica slovenica*, ISSN 1318-0207. [Tiskana izd.], 2012, vol. 59, no. 2, str. 366-374. <http://acta.chem-soc.si/59/59-2-366.pdf>. [COBISS.SI-ID 16097046]
- BAN, Irena, KRISTL, Matjaž, DANČ, Valerija, DANČ, Anita, DROFENIK, Mihael. Preparation of cadmium telluride nanoparticles from aqueous solutions by sonochemical method. *Materials letters*, ISSN 0167-577X. [Print ed.], 15. Jan. 2012, vol. 67, iss. 1, str. 56-59, doi: [10.1016/j.matlet.2011.09.001](https://doi.org/10.1016/j.matlet.2011.09.001). [COBISS.SI-ID 15371798]
- STERGAR, Janja, FERK, Gregor, BAN, Irena, DROFENIK, Mihael, HAMLER, Anton, JAGODIČ, Marko, MAKOVEC, Darko. The synthesis and characterization of copper-nickel alloy nanoparticles with a therapeutic Curie point using the microemulsion method. *Journal of alloys and compounds*, ISSN 0925-8388. [Print ed.], 5. nov. 2013, vol. 576, str. 220-226, ilustr., doi: [10.1016/j.jallcom.2013.04.130](https://doi.org/10.1016/j.jallcom.2013.04.130). [COBISS.SI-ID 16893718]
- FERK, Gregor, STERGAR, Janja, DROFENIK, Mihael, MAKOVEC, Darko, HAMLER, Anton, JAGLIČIĆ, Zvonko, BAN, Irena. The synthesis and characterization of copper-nickel alloy nanoparticles with a narrow size distribution using sol-gel synthesis. *Materials letters*, ISSN 0167-577X. [Print ed.], 2014, vol. 124, str. 39-42, ilustr., doi: [10.1016/j.matlet.2014.03.030](https://doi.org/10.1016/j.matlet.2014.03.030). [COBISS.SI-ID 17817110]