Univerza v Mariboru

MEDICINSKA FAKULTETA

UČNI NAČRT PREDMETA / SUBJECT SPECIFICATION	
Predmet:	Kemija
Subject Title:	Chemistry

Študijski program Study programme	Študijska smer Study field	Letnik Year	Semester Semester
Splošna medicina General Medicine – EMŠP	Splošna medicina General medicine	1	1

Univerzitetna koda predmeta / University subject code:

Predavanja Lectures	Seminar Seminar	Sem. vaje Tutorial	Lab. vaje Labor work	Teren. vaje Field work	Samost. delo Individ. work	ECTS
30			30		60	**4**

Nosilec predmeta / Lecturer: Red. prof. dr. Željko Knez

Jeziki / Languages:	**Predavanja / Lecture:**	slovenski / Slovene
	Vaje / Tutorial:	slovenski / Slovene

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

Prerequisits:

Vsebina:

- Zgradba atoma, kemične vezi, medmolekulske sile.
- Voda: strukture, lastnosti, H-vezi, hidrofobne interakcije, voda kot topilo.
- Raztopine: raztapljanje plinov v vodi, koligativne lastnosti raztopin, osmozni pojavi v celici.
- pH: ionizacija vode, Kw, pH, šibki in močni elektroliti, kisline in baze, pufri, puferski sistemi v organizmu, biološki pomen pH.
- Oksidoredukcija: definicije, kvantitativna karakterizacija redoks reakcij.
- Redoks potencial in reakcijska prosta entalpija.
- Hitrost kemičnih reakcij: definicije, red in molekularnost reakcij.
- Hitrost kemičnih reakcij in ravnotežje.
- Vpliv koncentracije, pH, ionske moči in temperature na hitrost reakcije.
- Molekulske osnove življenja: biološko pomembni elementi, ioni in biomolekule.
- Ogljik.
- Organske biomolekule: izomerija, medsebojni vpliv funkcionalnih skupin.
- Pregled organskih spojin po funkcionalnih skupinah.
- Kemija ogljikovih hidratov: monosaharidi, disaharidi, polisaharidi, homoglikani in heteroglikani.
- Kemija lipidov in steroidov.

Content (Syllabus outline):

- Structure of atom, chemical bound and intermolecular forces.
- Water: structures, properties, H-bound, hydrophobic interactions, water as solvent.
- Solutions: solubility of gases in water, colligative properties of solutions, osmotic phenomenon in the cell.
- pH: ionization of water, Kw, pH, weak and strong electrolytes, acids and bases, buffers, buffer systems in organism, biological importance of pH.
- Oxidoreduction: definition, quantitative characterization of redox reactions.
- Redox potential and reaction free enthalpy.
- Kinetics of chemical reactions: definitions, order and molecularity of reactions.
- Kinetics and equilibrium of chemical reactions.
- Influence of concentration, pH, ionic power and temperature on chemical reaction.
- Molecular basics of life: biological important elements, ions and biomolecules.
- Carbon.
- Organic biomolecules: isometry, interacting influence of functional groups.
- Review of organic substances according to their functional groups.

• Aminokisline. • Nukleotidi in nukleinske kisline.	• Chemistry of carbohydrates: monosaccharides, disaccharides, polysaccharides, homoglycanes and heteroglycanes. • Chemistry of lipids and steroids. • Amino acids. • Nucleotides in nucleonic acids.

Temeljni literatura in viri / Textbooks:

- F. Lazarini, J. Brenčič: Splošna in anorganska kemija, 3. izd., Državna založba Slovenije, Ljubljana, 1992.
- A. L. Lehninger, D. L. Nelson, M. M. Cox, J. Waites: Principles of biochemistry: with an extended discussion of oxygen-binding proteins, 2nd ed., 9th printing, Worth, New York, 2000.
- D. D. Ebbing, S. D. Gammon: General chemistry, 6th ed., Houghton Mifflin, cop., Boston, New York,1999.
- J. B. Umland, J. M. Bellama: General chemistry, 3rd ed., Brooks/Cole Publishing Company ITP, Pacific Grove, 1999.
- H. R. Hunt, T. F.Block, G. M. McKelvy: Laboratory experiments for general chemistry, 4th ed., Brooks/Cole-Thomson Learning, Australia, United States, 2002.
- S. H. Strauss: Guide to solutions for Inorganic chemistry, 3rd ed. University Press, Oxford, 1999.

Cilji:	**Objectives:**
Cilj tega predmeta je obnoviti osnovna znanja iz splošne kemije in poznavanja kemijske zgradbe molekul in reakcij, ter razumeti kemijske reakcije in procese v človeškem organizmu.	The objective of this course is to renew the basic knowledge of general chemistry and knowledge of the chemical structure of molecules and reactions, and to understand the chemical reactions and processes in human body.
Predvideni študijski rezultati:	**Intended learning outcomes:**
Pozaključku tega predmeta bo študent sposoben: • prepoznati in razlikovati molekule, • razumeti kemijske reakcije, ki potekajo v človeškem organizmu, • razložiti transportne pojave v človeškem orgamizmu. Prenesljive/ključne spretnosti in drugi atributi: • delo v skupini, • spretnost računanja.	On completion of this course the student will be able: • to recognize and differentiate molecules, • to understand the chemical reactions in human body, • to explain transport phenomenon in human body Transferable/Key Skills and other attributes: • team work, • computation skill.
Metode poučevanja in učenja:	**Learning and teaching methods:**
• predavanja, • laboratorijske vaje.	• lectures, • lab work.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
• pisni izpit	**60 %**	• written examination
• ustni izpit	**30 %**	• oral examination
• opravljene laboratorijske vaje	**10 %**	• completed lab work

Reference nosilca / Lecturer's references:

KNEZ, Željko, KAVČIČ, Sabina, GUBICZA, László, BÉLAFI-BAKÓ, Katalin, NÉMETH, Gergely, PRIMOŽIČ, Mateja, LEITGEB, Maja. Lipase-catalyzed esterification of lactic acid in supercritical carbon dioxide. The Journal of supercritical fluids, ISSN 0896-8446. [Print ed.], Jun. 2012, vol. 66, str. 192-197, doi: 10.1016/j.supflu.2011.11. [COBISS.SI-ID 15598102], [JCR, SNIP, WoS do 5. 8. 2012: št. citatov (TC): 0, čistih citatov (CI): 0, normirano št. čistih citatov (NC): 0, Scopus do 1. 1. 2014: št. citatov (TC): 1, čistih citatov (CI): 1, normirano št. čistih citatov (NC): 1]

ŠKERGET, Mojca, KNEZ, Željko, KNEZ HRNČIČ, Maša. Solubility of solids in sub- and supercritical fluids : a review. Journal of chemical and engineering data, ISSN 0021-9568, 2011, vol. 56, no. 4, str. 694-719, doi: 10.1021/je1011373. [COBISS.SI-ID 14935830], [JCR, SNIP, WoS do 18. 12. 2013: št. citatov (TC): 39, čistih citatov (CI): 38, normirano št. čistih citatov (NC): 21, Scopus do 15. 1. 2014: št. citatov (TC): 43, čistih citatov (CI): 42, normirano št. čistih citatov (NC): 24]

SINKOVIČ, Andreja, ŠURAN, David, LOKAR, Lidija, FLISER, Eva, ŠKERGET, Mojca, NOVAK, Zoran, KNEZ, Željko. Rosemary extracts improve flow-mediated dilatation of the brachial artery and plasma PAI-1 activity in healthy young volunteers. Phytotherapy research, ISSN 0951-418X, 2011, vol. 25, no. 3, str. 402-407. http://onlinelibrary.wiley.com/doi/10.1002/ptr.3276/pdf, doi: 10.1002/ptr.3276. [COBISS.SI-ID 3712575], [JCR, SNIP, WoS do 5. 6. 2013: št. citatov (TC): 2, čistih citatov (CI): 2, normirano št. čistih citatov (NC): 1, Scopus do 1. 5. 2013: št. citatov (TC): 2, čistih citatov (CI): 2, normirano št. čistih citatov (NC): 1]

KNEZ, Željko, ILIĆ, Ljiljana, ŠKERGET, Mojca, KOTNIK, Petra. High-pressure solubility data for palm oil-SF6 and coconut oil-SF6 systems. Journal of chemical and engineering data, ISSN 0021-9568, 2010, vol. 55, no. 12, str. 5829-5833, doi: 10.1021/je100782c. [COBISS.SI-ID 14648086], [JCR, SNIP, WoS do 18. 12. 2013: št. citatov (TC): 2, čistih citatov (CI): 1, normirano št. čistih citatov (NC): 1, Scopus do 3. 12. 2013: št. citatov (TC): 2, čistih citatov (CI): 1, normirano št. čistih citatov (NC): 1]

KNEZ, Željko, MARKOČIČ, Elena, NOVAK, Zoran, KNEZ HRNČIČ, Maša. Processing polymeric biomaterials using supercritical CO[sub]2. Chemie Ingenieur Technik, ISSN 0009-286X, 2011, vol. 83, no. 9, str. 1371-1380. [COBISS.SI-ID 15347734], [JCR, SNIP, WoS do 4. 9. 2013: št. citatov (TC): 2, čistih citatov (CI): 2, normirano št. čistih citatov (NC): 1, Scopus do 8. 1. 2014: št. citatov (TC): 5, čistih citatov (CI): 5, normirano št. čistih citatov (NC): 3]