2025/2026

Univerza v Mariboru
Medicinska fakulteta

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Ime predmeta:	**Kemija**
Course title:	**Chemistry**

Študijski program in stopnja Study programme and cycle	Študijska smer Study option	Letnik Year of study	Semester Semester
Splošna medicina, enovit magistrski študijski program		Prvi	1.
General medicine, Uniform master's degree study program		First	1st

Vrsta predmeta (obvezni ali izbirni) / Course type (compulsory or elective)	obvezni compulsory
Univerzitetna koda predmeta / University course code:	

Predavanja Lectures	Seminar Seminar	Vaje Tutorial			Klinične vaje Clinical training	Druge oblike študija Other forms of study	Samost. delo Individual work	ECTS
		AV	LV	RV				
30	0		30				30	3

Nosilec predmeta / Course coordinator:	**izr. prof. dr. Maša Knez Marevci**

Jeziki /Languages:	**Predavanja / Lectures:**	slovenski/slovene
	Vaje / Tutorial:	slovenski/slovene

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisites for enrolling in the course or for performing study obligations:**

Vsebina (kratek pregled učnega načrta):	**Content (syllabus outline):**
• Zgradba atoma, kemične vezi, medmolekulske sile, biološko pomembni elementi, radioizotopi. • Voda: strukture, lastnosti, H-vezi, hidrofobne interakcije, voda kot topilo. • Raztopine: raztapljanje plinov v vodi, koligativne lastnosti raztopin, osmozni pojavi v celici, osmodiuretiki. • pH: ionizacija vode, Kw, pH, šibki in močni elektroliti, kisline in baze, pufri, puferski sistemi v organizmu, porazdelitev ionov v organizmu, biološki pomen pH. • Oksidoredukcija: definicije, kvantitativna karakterizacija redoks reakcij.	• Structure of atom, chemical bound and intermolecular forces, biologically important elements, radioizotops. • 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, osmo-diuretics agents. • pH: ionization of water, Kw, pH, weak and strong electrolytes, acids and bases, buffers, buffer systems in organism, distribution of ions in the body, biological importance of pH.

• 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. • Organske biomolekule: izomerija, medsebojni vpliv funkcionalnih skupin. • Pregled organskih spojin po funkcionalnih skupinah. • Biološko pomembne organske molekule s primeri v medicini. • Kemija ogljikovih hidratov: monosaharidi, disaharidi, polisaharidi, homoglikani in heteroglikani. • Kemija lipidov in steroidov. • Aminokisline. • Nukleotidi in nukleinske kisline. • Vitamini. • Molekulsko modeliranje medicinsko pomembnih molekul in zdravil.	• 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. • Organic biomolecules: isometry, interacting influence of functional groups. • Review of organic substances according to their functional groups. • Biologically important organic molecules with examples in medicine. • Chemistry of carbohydrates: monosaccharides, disaccharides, polysaccharides, homoglycanes and heteroglycanes. • Chemistry of lipids and steroids. • Amino acids. • Nucleotides in nucleonic acids. • Vitamines. • Molecular modeling of medically important molecules and medicines

Temeljni literatura in viri / Reading materials:

Temeljna literatura

- F. Lazarini, J. Brenčič: Splošna in anorganska kemija, Fakulteta za kemijo in kemijsko tehnologijo, Ljubljana, 2014.
- P. M. Dewick: Essentials of Organic Chemistry: For Students of Pharmacy, Medicinal Chemistry and Biological Chemistry, John Wiley & Sons, 2013.
- Boyer, R.F., 2005. *Temelji biokemije*. Ljubljana: Študentska založba. str. XXVI, 634.

Dopolnilna literatura

- A. L. Lehninger, D. L. Nelson, M. M. Cox,: Principles of biochemistry 5 th ed., 3rd printing, Worth, New York, 2008.
- D. D. Ebbing, S. D. Gammon: General chemistry, 9th ed., Houghton Mifflin, cop., Boston, New York, 2009.
- Zeeck, Axel: Chemie für Medizine. 10., Aufl. München, 2020.
- Trevor Palmer, Philip L.R. Bonner, Enzymes: Biochemistry, Biotechnology, Clinical Chemistry, Woodhead Publishing 2007.

Cilji in kompetence:	**Objectives and competences:**
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:**
Znanje in razumevanje: Po zaključku tega predmeta bo študent sposoben: • prepoznati in razlikovati molekule,	Knowledge and understanding: On completion of this course the student will be able: • to recognize and differentiate molecules, • to understand the chemical reactions in human body,

• razumeti kemijske reakcije, ki potekajo v človeškem organizmu, razložiti transportne pojave v človeškem organizmu. Prenesljive/ključne spretnosti in drugi atributi: • delo v skupini, spretnost računanja.	• 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 %) / Share (in %)	**Assessment methods:**
Način (pisni izpit, ustno izpraševanje, naloge, projekt) • pisni izpit • ustni izpit • opravljene laboratorijske vaje ŠTUDIJSKE OBVEZNOSTI ŠTUDENTOV opravljene laboratorijske vaje, ustni in pisni izpit POGOJI ZA PRISTOP K POSAMEZNEMU PREVERJANJU ZNANJA Uspešno opravljen praktični del laboratorijskih vaj je pogoj za pristop na kolokvij, ki je pogoj za pristop na pisni izpit. Kolokvij iz laboratorijskih vaj je pisno preverjanje opravljenih laboratorijskih vaj. Ocena vaj pa je sestavljena iz sodelovanja na vajah, kar je ovrednoteno z 20% ocene, ostalih 80% predstavlja kolokvij iz vaj. . Izpit je pisni in ustni in je sestavljen iz nalog iz vseh področij. Tudi ustni del izpita se opravlja praviloma pisno. Ocena izpita je sestavljena iz ocen posameznih področij pisnega izpita in posameznih področij ustnega izpita ter ocene iz vaj, pri čemer morajo biti vsi deli pozitivno ocenjeni.	60 % 30 % 10 %	Type (examination, oral, coursework, project): • written examination • oral examination • completed lab work ACADEMIC OBLIGATIONS OF STUDENTS: completed laboratory work, oral and written exam REQUIREMENTS FOR ACCESS TO INDIVIDUAL KNOWLEDGE CHECKING: Successfully completed practical part of laboratory work is a requirement for access to the partial exam which is a requirement for access to the written exam. Partial exam in laboratory work is written checking of completed laboratory work. Assessment of laboratory work consists of cooperation during laboratory work which is evaluated with 20% of the mark and the rest 80% of the mark is represented by the partial exam in laboratory work. The exam is written and oral and consists of tasks from all areas. Also the oral part of the exam is regularly performed in a written form. The exam mark consists of marks of individual areas of the written exam and of individual areas of the oral exam and laboratory work, where each individual part must be positively evaluated.

Reference nosilca / Course coordinator's references:

Postružnik, V., Žitek Makoter, T., Goričanec, D., Kotnik, P., Knez, Ž. in Knez Marevci, M., 2023. Extraction of active compounds from mixtures of hemp (Cannabis sativa) with Pants of the Zingiberaceae family. *Molecules*, [na spletu] 28(23, [ ] 7826), str.18. Dostopno na: <doi:10.3390/molecules28237826>.

Slaček, G., Kotnik, P., Osmić, A., Postružnik, V., Knez, Ž., Finšgar, M. in Knez Marevci, M., 2023. The extraction process, separation, and identification of curcuminoids from turmeric curcuma longa. *Foods*, [na spletu] 12(21, [ ] 4000), str.14. Dostopno na: <https://dk.um.si/IzpisGradiva.php?id=87025>.

Žitek, T., Postružnik, V., Knez, Ž., Golle, A., Dariš, B. and Knez Marevci, M., 2022. Arnica Montana L. supercritical extraction optimization for antibiotic and anticancer activity. In: Frontiers in bioengineering and biotechnology, Frontiers in bioengineering and biotechnology. [online] p.9. Available at: <doi:10.3389/fbioe.2022.897185.

Žitek, T., Bjelić, D., Kotnik, P., Golle, A., Jurgec, S., Potočnik, U., Knez, Ž., Finšgar, M., Krajnc, I., Krajnc, I. and Knez Marevci, M., 2022. Natural hemp-ginger extract and its biological and therapeutic efficacy. Molecules, [online] 27(22), p.16. Available at: <doi:10.3390/molecules27227694>.

Kupnik, K., Leitgeb, M., Primožič, M., Postružnik, V., Kotnik, P., Kučuk, N., Knez, Ž. and Knez Marevci, M., 2022. Supercritical fluid and conventional extractions of high value-added compounds from pomegranate peels waste: production, quantification and antimicrobial activity of bioactive constituents. Plants, [online] 11(7), p.17. Available at: <doi:10.3390/plants11070928>.

Rožanc, J., Kotnik, P., Milojević, M., Gradišnik, L., Knez Marevci, M., Knez, Ž. and Maver, U., 2021. Different cannabis sativa extraction methods result in different biological activities against a colon cancer cell line and healthy colon cells. Plants, [online] 10(3), pp.1–15. Available at: <doi:10.3390/plants10030566>.

Žitek, T., Leitgeb, M., Golle, A., Dariš, B., Knez, Ž. and Knez Marevci, M., 2020. The influence of hemp extract in combination with ginger on the metabolic activity of metastatic cells and microorganisms. Molecules, [online] 25(21), pp.1–17. Available at: <doi:10.3390/molecules25214992>.