UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	ORGANSKA KEMIJA I
Course Title:	ORGANIC CHEMISTRY I

Študijski program in stopnja Study Programme and Level	Študijska smer Study Field	Letnik Academic Year	Semester Semester
UN Biokemija, 1. stopnja	**/**	**1.**	**2.**
USP Biochemistry, 1st Cycle	**/**	**1st**	**2nd**

Vrsta predmeta / Course Type: obvezni / Mandatory

Univerzitetna koda predmeta / University Course Code: BK109

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje Work	Druge oblike študija	Samost. delo Individual Work	ECTS
60	**15**	**/**	**/**	**/**	**75**	**5**

Nosilec predmeta / Lecturer: prof. dr. Janez Košmrlj / Dr. Janez Košmrlj, Full Professor

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

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisites:**
Študent oz. kandidat mora imeti predmet opredeljen kot študijsko obveznost.	The course has to be assigned to the student.

Vsebina:	**Content (Syllabus outline):**
Osnove strukture organskih molekul (kovalentna vez, hibridizacija ogljikovega atoma, energija vezi, dolžina in valenčni koti); nomenklatura organskih spojin (nasičeni, nenasičeni in aromatski ogljikovodiki, alkil in aril halogenidi, alkoholi, fenoli, etri in amini, karbonilne spojine: aldehidi in ketoni, karboksilne kisline in njihovi derivati). Splošne lastnosti organskih spojin (elektronska delokalizacija, resonance, resonančna energija, tavtomerija, dipolni moment); kislost in bazičnost organskih spojin (vpliv topila, induktivni, resonančni in sterični efekt ter vpliv hibridizacije); izomerija (konstitucijska izomerija in stereoizomerija, rotacija okrog C-C	Structure and bonding in organic molecules (ionic and covalent bonds, hybridization of the carbon atoms). Nomenclature of organic compounds (saturated, unsaturated and aromatic hydrocarbons, alkyl and aryl halides, alcohols, phenols, ethers and amines, carbonyl compounds: aldehydes, ketones, carboxylic acids and derivatives). Properties of organic compounds connected to the resonance (electron delocalization, resonance structures, resonance energy), tautomerism (keto-enol, nitro-acinitro, nitroso-oxime, imine-enamine and other tautomerisms), and dipole moment. Organic acids and bases: the influence of the solvent,

vezi v acikličnih spojinah, konformacije cikloalkanov, geometrijska izomerija, optična izomerija, relativna in absolutna konfiguracija, racemati). Reakcijski mehanizmi (vrste organskih reakcij, načini cepitve vezi, elektrofilni in nukleofilni reagenti, ogljikovi intermediati, prehodno stanje in aktivacijski kompleksi, kinetični in termodinamski produkti, kataliza, pozitivni katalizatorji in inhibitorji. Nukleofilne substitucije in eliminacije na nasičenih ogljikih (substitucije SN1 in SN2, stereokemija substitucij, substitucijam konkurenčne reakcije, reakcije alkil halogenidov in alkoholov, eliminacije E1 in E2, sin in anti eliminacije); adicije na alkene in alkine (elektrofilne adicije, cikloadicije, radikalske adicije); aromatske substitucije (aromatičnost, mehanizmi elektrofilnih substitucij, tipični primeri, vrste nukleofilnih aromatskih substitucij).	inductive, resonance and steric effect, the role of hybridization. Isomers in organic chemistry: rotamers, conformers, cis and trans isomerism, optical isomerism (enatiomers, diastereoisomers, optical activity, relative and absolute configuration, racemates). Types of organic reactions (radical and ionic cleavage, electrophilic and nucleophilic reagents, carbon intermediates, activation complex, free energy of activation, reaction rate, catalysis and catalysts). Nucleophilic substitutions on sp3 carbons (SN1, SN2 and their stereochemistry, competition reactions, applications in organic synthesis). Elimination reactions (E1 and E2 reactions, examples of sin and anti-eliminations). Additions involving alkenes and alkynes. Electrophilic and nucleophilic aromatic substitutions.

Temeljna literatura in viri / Readings:

- Organic chemistry with Biological Applications, John E. McMurry, 3rd edition, Cengage Learning, 2015.
- Organska kemija, Darko Dolenc, UL FKKT, 2019.

Cilji in kompetence:	**Objectives and Competences:**
Študent na primerih enostavnih modelnih spojin spozna osnovne principe in zakonitosti, po katerih potekajo kemijske pretvorbe organskih spojin ter povezavo med reaktivnostjo in lastnostmi spojine s strukturo molekule. Pridobljeno znanje študentu omogoča prepoznavanje reaktivnosti in lastnosti določenih kompleksnejših molekul.	Knowledge of the basic principles required to understand fundamental reactions of organic compounds. Understanding the connection between the structure and the properties of organic molecules. The students will be able to follow more advanced organic courses. Ability to use the IUPAC as well as the trivial nomenclature on various types of organic compounds. Ability to discuss general properties of organic substrates in connection with resonance, tautomerism, dipole moment etc. Interpretation of three-dimensional structures of various molecules. Ability to plan simple transformations of aliphatic and aromatic substrates employing nucleophilic substitutions and eliminations as well as electrophilic additions and aromatic substitutions.

Predvideni študijski rezultati:	**Intended Learning Outcomes:**
Znanje in razumevanje Študent spozna nekatere osnovne zakonitosti, ki veljajo v organski kemiji. Poleg znanj o reaktivnosti in lastnostih obravnavanih organskih spojin je sposoben načrtovati možnosti za njihovo interkonverzijo.	Knowledge and Comprehension Understanding the fundamentals of organic chemistry. Knowledge on structural features of organic compounds, structure-reactivity relationship, and typical organic transformations.
Uporaba Študent se seznani s posameznimi vrstami organskih spojin, z njihovo strukturo, reaktivnostjo in z možnostmi njihove interkonverzije. Skupaj s predmetom Organska kemija 2 dobi nekatere osnove za razumevanje biokemijskih procesov. Predmet pripravlja študenta za eksperimentalno delo v organskem laboratoriju.	Application Student acquires knowledge about the types of organic compounds, their structure, reactivity and possible interconversions. In combination with the Organic Chemistry II course, the student acquires some basics to understand biochemical processes. Student gets prepared for experimental work in an organic chemistry laboratory.
Refleksija Študent pridobi občutek za določene transformacije organskih spojin, ki jih je mogoče izvesti v laboratoriju.	Analysis Student learns basics for some transformation of organic compounds that can be conducted in laboratory.
Prenosljive spretnosti Izkušnje pri reševanju problemov, delo v skupinah, zbiranje in interpretacija rezultatov ter njihovo kritično vrednotenje.	Skill-transference Ability Experiences in solving problems, team work, collection and interpretation of results and their critical evaluation.

Metode poučevanja in učenja:	**Learning and Teaching Methods:**
Predavanja, seminarji.	Lectures, seminars.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
2 testa za sprotno preverjanje znanja in pisni izpit. Če študent na vsakem od obeh testov zbere najmanj 50% točk je lahko oproščen opravljanja izpita. Ocene: 6-10 (pozitivno), 1-5 (negativno)		2 tests and written exam. If a student gets 50% in both of the tests, he/she can be exempted from taking the exam. Ratings: 6-10 (positive), 1-5 (negative)

Reference nosilca / Lecturer's references:

- A. Demšar, **J. Košmrlj**, S. Petriček: Variable-temperature nuclear magnetic resonance spectroscopy allows direct observation of carboxylate shift in zinc carboxylate complexes. J. Am. Chem. Soc. 2002, 124, 3951–3958.

- D. Urankar, **J. Košmrlj**: Concise and Diversity-Oriented Synthesis of Ligand Arm-Functionalized Azoamides. J. Comb. Chem. 2008, 10, 981–985.

- Z. Časar, M. Steinbücher, **J. Košmrlj**: Lactone Pathway to Statins Utilizing the Wittig Reaction. The Synthesis of Rosuvastatin. J. Org. Chem. 2010, 75, 6681–6684.

- B. Pinter, D. Urankar, A. Pevec, F. De Proft, **J. Košmrlj**: Platinum mediated dinitrogen liberation from 2-picolylazide through a putative Pt=N double bond containing intermediate. Inorg. Chem. 2013, 4528–4533.

- A. Bolje, **J. Košmrlj**: A Selective Approach to Pyridine Appended 1,2,3-Triazolium Salts. Org. Lett. 2013, 15, 5084–5087.

- D. Cappoen, V. Majce, C. Uythethofken, D. Urankar, V. Mathys, M. Kočevar, L. Verschaeve, S. Polanc, K. Huygen, **J. Košmrlj**, Eur. J. Med. Chem. 2014, 74, 85–94.