Univerza v Mariboru

Fakulteta za naravoslovje in matematiko

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	**Organska kemija 1**
Course title:	**Organic chemistry 1**

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	**/**	**2**	**Zimski Autumn**
Five-year master's degree program Subject Teacher	**/**		

Vrsta predmeta / Course type	Obvezni / Obligatory
Univerzitetna koda predmeta / University course code:	17-UK13

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Lab. vaje Laboratory work	Terenske vaje Field work	Samost. delo Individ. work	ECTS
45					**75**	**4**

Nosilec predmeta / Lecturer:	Peter KRAJNC

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

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisits:**
Znanje splošne kemije.	Knowledge of general chemistry.

Vsebina:	**Content (Syllabus outline):**
Uvod: definicija, področja, namen in cilji organske kemije. Osnovni tipi organskih spojin- tvorba vezi (hibridizacija in teorija molekulskih orbital). Osnovni tipi organskih spojin-funkcionalne skupine. IUPAC nomenklatura organskih spojin. Izomerija, stereokemija, tavtomerija. Resonanca in vplivi substituentov. Tipične reakcije organskih spojin-predstavitev. Proton transfer-kisline in baze, pomen pKa, pKa lestvica. Lewisove kisline in baze. Kaj je reakcijski mehanizem; intermediati, kinetika in termodinamika. Organske reakcije: nukleofilne adicije na karbonilno skupino,	Introduction: definition, fields, goals of organic chemistry. Types of organic compounds-bond formation (hybridization and MO theory). Types of organic compounds-functional groups. IUPAC nomenclature of organic compounds. Isomery, stereochemistry, tautomery. Resonance and influence of substituents. Typical organic reactions-introduction. Proton transfer-acids and bases, pKa meaning and table. Lewis acids and bases. Reaction mechanism; reaction intermediates, kinetics and thermodynamics. Organic reactions: Nu aditions to carbonyl group, Nu substitutions and eliminations to carbonyl group,

nukleofilne substitucije in eliminacije na karbonilni skupini, nukleofilne substitucije in eliminacije na sp3 C atomu, polarne adicije. Laboratorijske vaje: 1. del: čiščenje organskih spojin, določanje fizikalnih konstant. 2. del: organska analitika- atomarna sestava, funkcionalne skupine, kromatografija.	Nu substitutions and eliminations to sp3 C atom, Polar additions. Experimental course: 1. part: purification of organic compounds, determination of physical constants. 2. part: organic analytics- elemental and functional consistency, chromatography.

Temeljni literatura in viri / Readings:

1. M. Tišler, Organska kemija, DZS Ljubljana, 1982.

2. S. Pine, Organic chemistry, McGraw-Hill, New York, 1987.

3. M. A. Fox, J. K. Whitesell, Organic Chemistry, Jones and Barlett, Boston, 1997.

4. P. Y. Bruice, Organic chemistry, Prentice Hall, 2006.

5. P. Krajnc, Navodila za vaje iz organske kemije, Maribor, 2007.

Cilji in kompetence:	**Objectives and competences:**
Spoznati obseg in cilje organske kemije ter vpetost vede v procese žive in nežive narave. Poznati principe povezovanja atomov v organskih molekulah ter tipe geometrije organskih molekul. Poznati nomenklaturo organskih spojin, v skladu z IUPAC pravili znati poimenovati spojino ter narisati ustrezno formulo, razpoznati različne izomere. Razumeti vplive skupin na reaktivnost molekule in predvidevati spremembe nastale zaradi spremenjene strukture. Poznati osnovne tipe organskih reakcij; substitucije, adicije, eliminacije. Razumeti pomen prenosa protona in vpliv pKa vrednosti.	To know: the goals and reach of organic chemistry, its role in living and non-living processes, the principles of atom bonding in organic molecules and types of molecule geometry, the rules of IUPAC nomenclature for organic compounds and to apply them for formulae naming, the differences in isomeric compounds, the basic types of organic reactions; substitutions, additions, eliminations. To understand the influences of functional groups on the molecule stability and reactivity. To understand the proton transfer importance and the influence of pKa value.

Predvideni študijski rezultati:	**Intended learning outcomes:**

Znanje in razumevanje: Študent pozna obseg in cilje organske kemije. Pozna principe povezovanja atomov v organskih molekulah, tipe hibridizacij. Zna uporabljati pravila IUPAC nomenklature za organske spojine. Razume vplive skupin na stabilnost in reaktivnost molekul. Pozna osnovne tipe organskih reakcij. Razume mehanizme kemijskih reakcij priprave. Zna razvrščati organske spojine med kisline in baze ter razume vpliv pKa vrednosti. **Prenesljive/ključne spretnosti in drugi atributi:**	**Knowledge and understanding:** Student knows the goals and reach of organic chemistry. Knows the principles of atom bonding in organic molecules and types of molecule geometry, types of hybridization. Student can apply the rules of IUPAC nomenclature to organic compounds thus naming them appropriately. Understands the influences of functional groups on the molecule stability and reactivity. Student is able to place organic compounds between bases and acids and realizes the importance of pKa value. **Transferable/Key Skills and other attributes:**

Metode poučevanja in učenja:	**Learning and teaching methods:**
Predavanja, seminarsko delo, laboratorijske vaje.	Lectures, seminar work, laboratory experiments.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Pisni izpit (ali kolokviji)	50	Written exam (or partial exams)
Ustni izpit	30	Oral exam
Laboratorijske vaje	20	Lab work

Reference nosilca / Lecturer's references:

1. KOVAČIČ, Sebastijan, JEŘÁBEK, Karel, KRAJNC, Peter, SLUGOVC, Christian. Ring opening metathesis polymerisation of emulsion templated dicyclopentadiene giving open porous materials with excellent mechanical properties. Polymer chemistry. [Print ed.], Feb. 2012, vol. 3, iss. 2, str. 325-328, doi: 10.1039/c2py00518b.

2. MAJER, Janja, KRAJNC, Peter. Amine functionalisations of glycidyl methacrylate based polyHIPE monoliths. Macromol. symp., Oct. 2010, vol. 296, iss. 1, str. 5-10, doi: 10.1002/masy.201051002.

3. PULKO, Irena, KRAJNC, Peter. High internal phase emulsion templating - a path to hierarchically porous functional polymers. *Macromol. rapid commun.*, 2012, vol. 33, issue 20, str. 1731-1746, doi: 10.1002/marc.201200393.

4. PULKO, Irena, SANDHOLZER, Martina, KOLAR, Mitja, SLUGOVC, Christian, KRAJNC, Peter. Removal of an olefin metathesis catalyst using 4-nitrophenyl acrylate based polymer supports. Tetrahedron lett.. [Print ed.], 2010, vol. 51, issue 44, str. 5827-5829, doi: 10.1016/j.tetlet.2010.08.114.

5. PULKO, Irena, WALL, Jennifer, KRAJNC, Peter, CAMERON, Neil R. Ultra-high surface area functional porous polymers by emulsion templating and hypercrosslinking : efficient nucleophilic catalyst supports.

Chemistry (Weinh., Print). [Print ed.], Feb. 2010, vol. 16, iss. 8, str. 2350-2354, doi: 10.1002/chem.200903043.

Projekti/Projects:

L2—2008 Makroporozne polimerne membrane za separacijo biomakromolekul

L2—2283 Vpliv sestave polimerizacijske mešanice na latnosti poroznih monolitov

J2—1176 Separacija in formulacija biološko aktivnih snovi izoliranih iz rastlinskih materialov