Univerza v Mariboru

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Fakulteta za naravoslovje in matematiko

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Nevarne snovi v bivalnem okolju
Course title:	Pollutants in living environment

Študijski program in stopnja **Study programme and level**	**Študijska smer** **Study field**	**Letnik** **Academic year**	**Semester** **Semester**
Biologija in ekologija z naravovarstvom, 2. stopnja	**/**	**1/2**	**Poletni/ Zimski**
Biology and Ecology with Nature Conservation, 2nd Level	**/**	**1/2**	**Summer/ Winter**

Vrsta predmeta / Course type	Izbirni / elective
Univerzitetna koda predmeta / University course code:	

Predavanja **Lectures**	**Seminar** **Seminar**	**Sem. vaje** **Tutorial**	**Lab. vaje** **Laboratory work**	**Teren. vaje** **Field work**	**Samost. delo** **Individ. work**	**ECTS**
15	**15**		**15**		**135**	**6**

Nosilec predmeta / Lecturer:	Ernest Vončina Darinka Brodnjak Vončina

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

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

Vsebina:

Predmet obravnava problematiko onesnaževanja okolja z organskimi spojinami. Podaja in opisuje eksterno in interno izpostavljenost človeka v bivalnem okolju s kontaminanti. Poudarja pomembnost izpostavljenosti za okoljsko ozadje značilnih koncentracijah nevarnih spojin v bivalnem in širšem okolju.

Razumevanje vpliva onesnažil na bivalno okolje in na zdravje ljudi je pomembno za ohranjanje čistega okolja. Pri predmetu se študenti seznanijo z nevarnimi spojinami, ki so predvsem posledica antropogenega vpliva na okolje. Seznanijo se z metodami za ugotavljanje vsebnosti onesnažil in njihovih razgradnih produktov v okolju.

Predmet obravnava onesnažila kot so policiklični aromatski ogljikovodiki, nitrozamini, fenolne spojine, pesticidi in tradicionalni organoklorni insekticidi, onesnažila s področja tehničnih kemikalij kot so estri ftalne in fosforjeve kisline, poliklorirani naftaleni, bifenili, dioksini in furani, polibromirani difenil etri vključno z perfluoriranimi spojinami površinsko aktivnih snovi. Predmet podaja porazdeljevanje spojin v okolju (zrak, voda, sediment/zemlja), njihovo obstojnost, globalno razširjenost, biotsko koncentriranje in razgradnjo, ter daje pregled nad potencialno nevarnostjo, ki jo predstavljajo. Predmet obravnava pomembnejše spojine, ki onesnažujejo (spreminjajo) okolje predvsem kot motilci naravnega hormonalnega (endokrinega) ravnotežja človeka. Sem spadajo naravne estrogene spojine in spojine, ki jih je proizvedel človek hote za potrebe industrije in kmetijstva ter spojine, ki nastajajo nehote, kot stranski produkti industrijskih procesov.

Pri predavanjih so obravnavane posamezne skupine organskih onesnažil okolja:

-kemijska opredelitev spojin z njihovimi fizikalno kemijskimi lastnostmi kot

Content (Syllabus outline):

Understanding the environment pollution with hazardous substances. The subject explains external and internal exposure of humans to pollutants and the importance of exposure to background pollutant concentrations in living environment.

Understanding influence of pollutants on the environment and human health is essential for preserving clear environment. Students are acquainted with hazardous substances which are mostly a consequence of anthropogenic impact on environments. They gain knowledge of methods for determination of pollutants and their degradation products in the environment. The subject is dealing with pollutants such as: polycyclic aromatic hydrocarbons, nitrozamines, phenolic compounds, pesticides and traditional organochloric insecticides, esters of phtalic and phosphoric acids as technical chemicals pollutants, polychlorinated naphtalenes, biphenyls, dioxins and furans, polybrominated diphenyl ethers including perfluorinated substances of surface active compounds. Subject is discussing the distribution of hazardous substances in environment (air, water, sediment/soil), their persistence, global distribution, biotic concentration and degradation. It surveys potential risk of hazardous substances.

Subject gives knowledge on important substances which can modify environment especially as disruptors of natural hormonal endocrinal equilibrium of human organism. These substances are natural estrogen compounds and substances made by human for use in industry and agriculture, and substances made unintentionally as byproducts of industrial processes.

The subject addresses particular groups of environmental organic pollutants:

-Chemical identification of substances by their physical and chemical properties as

skupinskimi parametri -s fizikalno kemijskimi lastnostmi podprto porazdeljevanje spojin v okolju (voda, zrak, sediment) -različne poti vstopanja predstavljenih spojin v okolje in možnosti ter sposobnosti okolja za njihovo razgradnjo - poti vstopanja spojin v prehranjevalno verigo človeka in nevarnosti, ki jo predstavljajo za njegovo zdravje - poti razširjanja in preprečevanja razširjanja nevarnih spojin v okolje -različni analitski postopki za določevanje organskih onesnažil -predavanja bodo širila zavest o pomembnosti ohranjanja zdravega okolja -	grouping parameters -Distribution of substances in environment (water, air, sediment) on the base of their physical-chemical properties. -Different modes of introducing hazardous substances into environment and environment ability for their degradation -Mode of incoming of substances into the food chain of humans and risks for human health -Modes of distribution and prevention of distribution of hazardous substances into environment -Different analytical methods for determination of organic pollutants - -The subject will help to propagate ideas of importance to preserve clear environment

Temeljni literatura in viri / Readings:

- Baird C, 1995 Environmental Chemistry, New York.
- Colborn T., D. Dumanoski, J.P.Myers, 1996, Our Stolen Future, A Dutton Book, Penguin Group.
- Fellenberg, G.,2000: The Chemistry of pollution, John Willey and Sons, LTD, Chichester, New York.
- Hutzinger, O. 1984: The Handbook of Environmental Chemistry, The Natural Environment and Biogeochemical Cycles, Springer-Verlag, Berlin, Heidelberg.
- Moore, J.W., 1991: Inorganic Contaminants of surface water, Research and monitoring priorities, Springer –Verlag.

Cilji:	**Objectives:**
Študenti: • Razumejo metode, ki se uporabljajo v moderni okoljski kemiji za odkrivanje in določanje vsebnosti nevarnih snovi in njihovih razgradnih produktov v okolju; • usvojijo temeljno in poglobljeno znanje o prisotnosti nevarnih snovi v okolju • spoznajo osnovne principe delovanja nevarnih snovi na človeka • spoznajo področja uporabe znanj o	Students: • understand basic methods used in modern environmental chemistry for detecting and determinating the contents of hazardous substances and their degaradation products in environments; • They acquire basic and advanced knowledge necessary to study the occurence of hazardous substances in

vplivu nevarnih snovi na okolje • spoznajo principe preprečevanja onesnaževanja	environment; • They get knowledge of basic principles of influences of hazardous substances on humans • They get knowledge of fields where knowledge of hazardous substances influences on environment can be applied; • They are acquainted with basic principles of prevention of contamination
Predvideni študijski rezultati:	**Intended learning outcomes:**
Znanje in razumevanje: Študenti: • razumejo osnovne metode v okoljski kemiji; • usvojijo temeljno in poglobljeno znanje s področja nevarnih snovi v okolju; • razumejo znanja okoljske kemije, ki so nujno potrebna na drugih področjih obravnave okolja; • spoznajo področja, na katerih se aplicirajo znanja o nevarnih snoveh v okolju Prenesljive/ključne spretnosti in drugi atributi: Študenti: • pridobijo izkušnje in laboratorijske spretnosti, ki so nujno potrebne pri samostojnem laboratorijskem delu; • so sposobni razumeti znanstvene prispevke in zahtevnejšo študijsko literaturo.	Knowledge and Understanding: Students: • understand basic methods used in modern environmental chemistry; • acquire basic and advanced knowledge on hazardous substances in environment; • understand the knowledge of environmental chemistry essential for other subjects in the field of environment; • gain knowledge of areas in which knowledge of hazardous substances in environment is applied Transferable/Key Skills and other attributes: Students: • students acquire experience and laboratory skills which are essential for an autonomous laboratory work; • they are able to understand articles in basic scientific journals and more advanced text-books.
Metode poučevanja in učenja:	**Learning and teaching methods:**

• - Predavanja • Laboratorijske vaje • Seminarska naloga	• Lectures • Laboratory excersises • Seminar essay

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
• Laboratorijski dnevnik • Kolokvij iz analiznih metod • Pisni izpit	**20** **40** **40**	• Diary of laboratory excercises • Partial exam of analytical methods • Written exam

Reference nosilca / Lecturer's references:

Ernest Vončina:

ALFIREVIĆ, Marjetka, KRIŽANEC, Boštjan, VONČINA, Ernest, BRODNJAK-VONČINA, Darinka. Presence of nonylphenols in plastic films and their migration into food simulants. *Acta chim. slov.*. [Tiskana izd.], 2011, vol 58, no. 1, str. 127-133. http://acta.chem-soc.si/58/58-1-127.pdf. [COBISS.SI-ID 14880790]

KAIŠAREVIĆ, Sonja N., HILSCHEROVA, Klara, WEBER, Roland, SUNDQVIST, Kristina L., TYSKLIND, Mats, VONČINA, Ernest, BOBIC, Stanka, ANDRIĆ, Nebojša, POGRMIC-MAJKIC, Kristina, VOJINOVIĆ-MILORADOV, Mirjana, GIESY, John Paul, KOVAČEVIĆ, Radmila. Characterization of dioxin-like contamination in soil and sediments from the "hot spot" area of petrochemical plant in Pancevo (Serbia). *Environ. sci. pollut. res. int.*. [Print ed.], 2011, vol. 18, no. 4, str. 677-686, doi: 10.1007/s11356-010-0418-8. [COBISS.SI-ID 15555606]

VONČINA, Ernest, BRODNJAK-VONČINA, Darinka, SOVIČ, Nataša, NOVIČ, Marjana. Chemometric characterisation of the quality of ground waters from different wells in Slovenia. *Acta chim. slov.*. [Tiskana izd.], 2007, vol. 54, no. 1, str. 119-125. http://acta.chem-soc.si/54/54-1-119.pdf. [COBISS.SI-ID 11161110]

PETRIĆ, Ines, HRŠAK, Dubravka, FINGLER, Sanja, VONČINA, Ernest, ĆETKOVIĆ, Helena, BEGONJA KOLAR, Ana, UDIKOVIĆ KOLIĆ, Nikolina. Enrichment and characterization of PCB-degrading bacteria as potential seed cultures for bioremediation of contaminated soil. *Food technol. biotechnol.*, 2007, vol. 45, issue 1, str. 11-20. [COBISS.SI-ID 516722713]

Darinka Brodnjak Vončina:
ALFIREVIĆ, Marjetka, KRIŽANEC, Boštjan, VONČINA, Ernest, BRODNJAK-VONČINA, Darinka. Presence of nonylphenols in plastic films and their migration into food simulants. *Acta chim. slov.*. 2011, vol 58, no. 1, str. 127-133.

GOLOB, Darko, MAJCEN LE MARECHAL, Alenka, BRODNJAK-VONČINA, Darinka, NOVAK, Nina. The application of the experimental design and the artificial neural network to the UV/H202 decolouration process of textile metal-complex dyes = Primjena eksperimentalnog koncepta i umjetnih neuronskih mreža u procesu obezbojavanja otopiva metalkompleksnih bojila s UV/H202. *Tekstil*, Aug. 2008, vol. 57, no. 8, str. 397-404, 405-413.

ŠNUDERL, Katja, SIMONIČ, Marjana, MOCAK, Jan, BRODNJAK-VONČINA, Darinka. Multivariate data analysis of natural mineral waters. *Acta chim. slov.*. 2007, vol. 54, 1, str. 33-39.

VONČINA, Ernest, BRODNJAK-VONČINA, Darinka, SOVIČ, Nataša, NOVIČ, Marjana. Chemometric characterisation of

the quality of ground waters from different wells in Slovenia. *Acta chim. slov.*. 2007, vol. 54, no. 1, str. 119-125.

CENCIČ-KODBA, Zdenka, BRODNJAK-VONČINA, Darinka. A rapid method for the determination of organochlorine, pyrethroid pesticides and polychlorobiphenyls in fatty foods using GC with electron capture detection. *Chromatographia*, Oct. 2007, 66, no. 7/8, str. 619-624.