



Univerza v Mariboru

Fakulteta za naravoslovje  
in matematiko

### UČNI NAČRT PREDMETA / COURSE SYLLABUS

<b>Predmet:</b>	<b>Nevarne snovi in njihov vpliv na vodne ekosisteme</b>
<b>Course title:</b>	<b>Hazardous substances and their impact on aquatic ecosystems</b>

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Doktorski študij Ekološke znanosti, 3. stopnja		1. ali 2.;	1.- 4.;
Doctoral Study Ecological Sciences, 3rd degree		1st or 2nd	1st-4th

Vrsta predmeta / Course type: Izbirni/Elective

Univerzitetna koda predmeta / University course code:

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Lab. vaje Laboratory work	Terenske vaje Field work	Samost. delo Individ. work	ECTS
15	15				150	6

Nosilec predmeta / Lecturer: Doc. dr. Mojca Kos Durjava

Jeziki / Predavanja / Lectures: slovenski / Slovene  
Languages: Vaje / Tutorial: slovenski / Slovene

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

Poznavanje kemije in ekologije na ravni univerzitetnega programa.

**Prerequisites:**

Knowledge of chemistry and ecology at graduate level.

**Vsebina:**

Nevarne snovi so snovi, ki imajo negativen učinek na vodne ekosisteme. Vpliv je odvisen od fizikalno kemijskih lastnosti snovi, poradelitve snovi in njihovega obnašanja v okolju in od strupenosti za vodne organizme. Za oceno učinka nevarnih snovi na vodne ekosisteme potrebujemo orodja, s katerimi pridobimo naštetje podatke o snoveh. Z izvedbo laboratorijskih testov strupenosti z

**Content (Syllabus outline):**

Hazardous substances are substances that have a negative effect on aquatic ecosystems. The effect depends on the physico-chemical properties of the substance, the distribution of the substance and its behavior in the environment and on the toxicity to aquatic organisms. To assess the impact of hazardous substances on aquatic ecosystems, we need tools to obtain the listed information on

vodnimi organizmi pridobimo podatke o strupenosti za le te. Pridobljeni podatki se lahko med drugim uporabljajo v okviru kemijske zakonodaje REACH, pri obravnavi nevarnih snovi v okviru Vodne direktive in v okviru Industrijske emisijske direktive.

substances. By carrying out ecotoxicity laboratory tests for aquatic organisms, we shall provide data on toxicity for these. The data obtained may, inter alia, be used in the framework of REACH chemical legislation, in the treatment of hazardous substances under the Water Framework Directive and in the Industrial Emission Directive.

#### **Temeljni literatura in viri / Readings:**

- Schwedt, G., The Essential Guide to Environmental Chemistry, 2001
- Rand, G. M., Fundamentals of Aquatic Toxicology, 1995
- Leeuwen, C.J. van, Vermeire, T.G., Risk Assessment of Chemicals: An Introduction, 2007.

#### **Cilji in kompetence:**

Temeljni cilji predmeta so usposobiti študente za:

- prepoznavo in opredelitev vrste nevarnih snovi;
- uporabo metod za oceno usode in obnašanja nevarnih snovi v vodnih ekosistemih in za testiranje strupenosti za vodne organizme;
- oblikovanje in vrednotenje instrumentov, ki merijo učinek nevarnih snovi na vodne ekosisteme v skladu s kemijsko zakonodajo REACH, vodno direktivo in industrijsko emisijsko direktivo;
- oblikovanje in vrednotenje nevarnih snovi in njihovega vpliva na vodne ekosisteme;
- kvantitativno in kvalitativno evalvacijo vpliva nevarnih snovi na vodne ekosisteme.

#### **Objectives and competences:**

The main objectives of the course are to enable students to:

- identifying and define types of hazardous substances;
- the use of methods for assessing the fate and behavior of hazardous substances in aquatic ecosystems and for the testing of aquatic toxicity;
- design and evaluation of instruments that measure the effect of hazardous substances on aquatic ecosystems in accordance with REACH Chemical legislation, the Water Framework Directive and the Industrial Emission Directive;
- design and evaluation of hazardous substances and their impact on aquatic ecosystems;
- quantitative and qualitative evaluation of the impact of hazardous substances on aquatic ecosystems.

#### **Predvideni študijski rezultati:**

#### **Intended learning outcomes:**

**Znanje in razumevanje:**

Po končanem in samostojnem delu bodo študentje pridobili znanja in spretnosti potrebne za samostojno raziskovalno delo na področju ocene učinka nevarnih snovi na vodne ekosisteme.

**Prenesljive/ključne spretnosti in drugi atributi:**

Sposobnost identifikacije, analize, presoje, ovrednotenja in predstavitve izbranega problema učinka nevarne snovi na vodne ekosisteme.

**Knowledge and understanding:**

After completion of the course and independent work, students will gain the knowledge and skills necessary for independent research work in assessing impact of hazardous substances on aquatic ecosystems.

**Transferable/Key Skills and other attributes:**

Competence to identify, analyse, evaluate and present chosen problem of impact of hazardous substance on aquatic ecosystem.

**Metode poučevanja in učenja:**

- Predavanja, seminarsko delo, individualne konzultacije.

**Learning and teaching methods:**

- Lectures, seminar work, individual consultations.

<b>Načini ocenjevanja:</b>	<b>Delež (v %) / Weight (in %)</b>	<b>Assessment:</b>
Seminarsko delo	70 %	Seminar work
Zagovor seminarskega dela	30 %	The defense of seminar work

**Reference nosilca / Lecturer's references:**

BAMPIDIS, Vasileios, RAMOS, Maria de Lourdes da Silva, CHRISTENSEN, Henrik, DUSEMUND, Birgit, KOUBA, Maryline, KOS DURJAVA, Mojca, LÓPEZ-ALONSO, Marta, LÓPEZ PUENTE, Secundino, MARCONI, Francesca, MAYO, Baltasar, PECHOVÁ, Alena, PETKOVA, Mariana, RAMOS, Fernando, SANZ, Yolanda, VILLA, Roberto Edoardo, WOUTERSEN, Ruud, BROCK, Theo C. M., KNECHT, Joop de, KOLAR, Boris, BEELEN, Patrick van, PADOVANI, Laura, TARRÉS-CALL, Jordi, VETTORI, Maria Vittoria, AZIMONTI, Giovanna. Guidance on the assessment of the safety of feed additives for the environment : EFSA Panel on Additives and Products or Substances used in Animal Feed (EFSA FEEDAP Panel) : scientific opinion. EFSA journal, ISSN 1831-4732, Apr. 2019, vol. 17, iss. 4, 78 str., tabele, doi: 10.2903/j.efsa.2019.5648.

KOS DURJAVA, Mojca, KOLAR, Boris, ARNUŠ, Lovro, PAPA, Ester, KOVARICH, S., SAHLIN, U., PEIJNENBURG, Willie J. G. M. Experimental assessment of the environmental fate and effects of triazoles and benzotriazole. ATLA. Alternatives to laboratory animals, ISSN 0261-1929, 2013, vol. 41, no. 1, str. 65-75.

KOS DURJAVA, Mojca, KOLAR, Boris, BALK, Froukje, PEIJNENBURG, Willie J. G. M. Water framework directive and specific pollutants in surface waters in Slovenia = Vodna direktiva in posebna onesnaževala za površinske vode v Sloveniji. Acta hydrotechnica, ISSN 0352-3551.

[Tiskana izd.], 2013, 26, [št.] 45, str. 61-69.

KOLAR, Boris, ARNUŠ, Lovro, KRIŽANEC, Boštjan, PEIJNENBURG, Willie J. G. M., KOS DURJAVA, Mojca. Bioaccumulation of polybrominated diphenyl ethers by Tubifex Tubifex. *Acta chimica slovenica*, ISSN 1318-0207. [Tiskana izd.], 2016, vol. 63, no. 3, str. 678-687, doi: 10.17344/acsi.2016.2617.