

**UČNI NAČRT PREDMETA / COURSE SYLLABUS**

**Predmet:** EKOTOKSIKOLOGIJA  
**Course title:** ECOTOXICOLOGY

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Okoljske in regionalne študije, doktorski študij 3. stopnje	Biodiverziteta in ekologija		
Environmental and Regional Studies, doctoral study 3 <sup>rd</sup> level	Biodiversity and ecology		

**Vrsta predmeta / Course type**

Izbirni/ Elective

**Univerzitetna koda predmeta / University course code:**

DIB07

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje work	Druge oblike študija	Samost. delo Individ. work	ECTS
30	15			15	120	6

**Nosilec predmeta / Lecturer:**

Doc. dr. Paula Pongrac

**Jeziki /  
Languages:**

**Predavanja / Lectures:  
Vaje / Tutorial:**

slovenščina, angleščina / Slovene, English

slovenščina, angleščina / Slovene, English

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

Opravljen prva in druga stopnja študija biologije ali ekvivalentne smeri

**Prerequisite:**

Finished bachelors and masters degree in Biology or equivalent program of study

**Vsebina:**

- Zgodovina in uvod; definicija pojmov v toksikologiji in ekologiji
- Viri, vrste in lastnosti strupov v okolju
- Razporeditev in transformacija strupov v okolju
- Doza in koncentracija
- Molekularni, biokemijski, fiziološki in vedenjski odzivi organizmov na strupe
- Vplivi na populacije, združbe in ekosistem
- Biološki markerji in biomonitoring strupov v okolju
- Ocene tveganja
- Ekotoksikologija in nadzor

**Content (Syllabus outline):**

- History and introduction; terminology in toxicology and ecology
- Sources, types and properties of toxins in the environment
- Dose and concentration: Response relationships
- Distribution and transformation of toxins in the environment
- Molecular, biochemical, physiological and behavioural responses of organisms
- Effects on population, community and ecosystem
- Biomarkers and biomonitoring of toxins
- Ecological risk assessment

- Ecotoxicology and management of toxins

**Temeljni literatura in viri / Readings:**

- Sparling D.W. 2016: Ecotoxicology Essentials: Environmental Contaminants and Their Biological Effects on Animals and Plants. Academic Press.
- Walker C.H., Sibly R.M., Hopkin S.P., Peakall D.B. 2012: Principles of Ecotoxicology, Fourth Edition. CRC Press.
- Connell, D.W., Lam, P., Richardson, B., Wu, R. (1999) Introduction to Ecotoxicology. Wiley-Blackwell.

**Cilji in kompetence:**

Onesnaženje okolja je ena izmed najbolj resnih groženj našemu planetu. Vse večje število in vse večja raznolikost strupov iz različnih virov (npr. iz industrije, kmetijstva in medicine) prispeva k bremenu, ki se ga moramo naučiti omejiti, nadzorovati in odpraviti. Z vrednotenjem strupenih učinkov na naravne sisteme se ukvarja nova veja znanosti, ekotoksikologija. Skozi predavanja študentom, ki naj bi za razumevanje snovi obvladali osnove kemije in biologije, bomo obravnavali vrste, lastnosti in delovanje strupov v okolju, pomen koncentracije in doze ter učinkov strupov na organizme, populacije, združbe in ekosisteme. Nadalje bomo obravnavali koncepte ocene tveganja, uporabo bioloških markerjev in biomonitoring ter nadzora nad strupi.

**Objectives and competences:**

Environmental pollution is one of the most serious threats to the future health of our planet. A wide and ever increasing range of chemicals from industry, agriculture and medicine continue to contribute to the earth's chemical load. Ecotoxicology evaluates the effects of toxins in natural ecosystems. Students, who have need to understand the basics of chemistry and biology, will learn of nature, properties and behaviour of environmental toxins, dose/response relationships and effects on organisms, populations, communities and ecosystems. In addition, environmental management areas such as biomarkers, biomonitoring, ecological risk assessment and the ecotoxicology and management of chemicals will be included.

**Predvideni študijski rezultati:**

- Poznavanje konceptov v toksikologiji, ekologiji in ekotoksikologiji.
- Razumevanje postopkov za predvidevanje učinkov strupov na okolje.
- Poznavanje načinov za preprečevanje, omejevanje in odpravo posledic zastrupljenosti okolja.

**Intended learning outcomes:**

- Understanding basic concepts of toxicology, ecology and ecotoxicology.
- Understanding processes of predicting the effects of pollution on organisms.
- Knowledge of ways to prevent, limit or remediate any detrimental effects in the environment.

**Metode poučevanja in učenja:**

- Predavanja z aktivnim sodelovanjem študentov
- Seminarji in njihove predstavitve
- e-učenje

**Learning and teaching methods:**

- Lectures with active participation by students
- Written essays and their presentation
- e-learning

**Načini ocenjevanja:**

Delež (v %) /

Weight (in %)

Assessment:

<ul style="list-style-type: none"> <li>● Izpit</li> <li>● Seminarska naloga</li> <li>● Predstavitev seminarske naloge</li> </ul>	<b>40</b> <b>40</b> <b>20</b>	<ul style="list-style-type: none"> <li>● Written exam</li> <li>● Essay</li> <li>● Presentation of the essay</li> </ul>
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**Reference nosilca / Lecturer's references:**

<ol style="list-style-type: none"> <li>1. <b>Pongrac, P.</b>, Fischer, S., Thompson, J. A., Wright, G., &amp; White, P. J. (2020). Early responses of Brassica oleracea roots to zinc supply under sufficient and sub-optimal phosphorus supply. <i>Frontiers in plant science</i>, 10, 1645.</li> <li>2. <b>Pongrac, P.</b>, Castillo-Michel, H., Reyes-Herrera, J., Hancock, R. D., Fischer, S., Kelemen, M., ... &amp; Vavpetič, P. (2020). Effect of phosphorus supply on root traits of two Brassica oleracea L. genotypes. <i>BMC Plant Biology</i>, 20(1), 1-17.</li> <li>3. <b>Pongrac, P.</b>, Arčon, I., Castillo-Michel, H., &amp; Vogel-Mikuš, K. (2020). Mineral Element Composition in Grain of Awnead and Awnletted Wheat (<i>Triticum aestivum</i> L.) Cultivars: Tissue-Specific Iron Speciation and Phytate and Non-Phytate Ligand Ratio. <i>Plants</i>, 9(1), 79.</li> <li>4. Höreth, S., <b>Pongrac, P.</b>, van Elteren, J. T., Debeljak, M., Vogel-Mikuš, K., Weber, M., ... &amp; Pelicon, P. (2020). <i>Arabidopsis halleri</i> shows hyperbioindicator behaviour for Pb and leaf Pb accumulation spatially separated from Zn. <i>New Phytologist</i>, 226(2), 492-506.</li> <li>5. White, P.J., <b>Pongrac, P.</b> (2016) Heavy metal toxicity in plants. In: <i>Plant Stress Physiology</i>. Ed. Shabala, S.; CABI Publishing; in press.</li> </ol>
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