

UČNI NAČRT PREDMETA / COURSE SYLLABUS

Predmet:	EKOSISTEMSKA BIOLOGIJA
COURSE TITLE:	ECOSYSTEM BIOLOGY

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Varstvo okolja in ekotehnologije, 1. stopnja		1.	
Environmental Protection and Eco-technologies, 1st level		1rd	

Vrsta predmeta / Course type Obvezni predmet / Obligatory subject

Univerzitetna koda predmeta / University course code: EB

Predavanja Lectures	Seminar Seminar	Sem. Vaje Tutorial	Lab. vaje Laboratory work	Teren. vaje Field work	Samost. delo Individ. work	ECTS
30		30			100	6

Nosilec predmeta / Lecturer: doc. dr. Nataša Smolar-Žvanut / Assist. Prof. Dr. Nataša Smolar-
žvanut

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

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

Osnovno znanje iz biologije in ekologije.

Prerequisites:

Basic knowledge of biology and ecology.

Vsebina:

- **Značilnosti živih bitij**
(življenska pestrost, organizacija življenja, osnove taksonomije, organizmi v prostoru in času)
- **Dejavniki okolja**
(neživi in živi dejavniki okolja, soodvisnost dejavnikov okolja, prilagoditev organizmov na okolje)
- **Značilnosti populacij**
(ekološke značilnosti populacij, gostota, disperzija, nataliteta, mortaliteta, starostna in spolna struktura)
- **Vrstni in medvrstni odnosi med organizmi**
(kompeticija, parazitizem, sožitje, ..)
- **Zgradba in delovanje ekosistemov**

Content (Syllabus outline):

- **Characteristics of organisms**
(life variety, organization of life, basics of taxonomy, organisms in space and time)
- **Environmental factors**
(abiotic and biotic factors of the environment, interdependence of environmental factors, adaptation of organisms to the environment)
- **Population characteristics**
(ecological characteristics of populations, density, dispersion, natality, mortality, age and sexual structure)
- **Intraspecific and interspecific relationships among organisms**
(competence, parasitism, coexistence, ..)

<p>(življenjska združba, življenjski prostor, analiza in primerjava združb, kroženje snovi in pretok energije, ekološka sukcesija)</p> <ul style="list-style-type: none"> - Ekološka različnost ekosistemov (kopenski in vodni ekosistemi) - Vplivi človekovih dejavnosti na ekosisteme ter ukrepi za izboljšanje stanja ekosistemov (onesnaževanje, hidrološke in morfološke obremenitve, biološke obremenitve, turizem) 	<ul style="list-style-type: none"> - The structure and function of ecosystems (biocenosis, biotope, analysis and comparison of communities, circulation of substances and energy flow, ecological succession) - The ecological diversity of ecosystems (terrestrial and aquatic ecosystems) - The impacts of human activities on ecosystems and measures to improve the state of ecosystems (pollution, hydrological and morphological pressures, biological pressures, tourism)

Temeljni literatura in viri / Textbooks:

Obvezna / Required:

1. Tarman, K. 1992. Osnove ekologije in ekologija živali. Državna založba Slovenije, Ljubljana.
2. Tome, D. 2006. Ekologija. Organizmi v prostoru in času. Tehniška založba Slovenije, Ljubljana.

Priporočena / Recommended:

3. Odum, E. P., Barrett, G. W., 2005. Fundamentals of Ecology – 5th edition.
4. Izbrani članki iz znanstvenih revij. Selected articles from scientific journals.

Cilji in kompetence:

Predmetno specifični cilji in kompetence:

- Študenta seznaniti z ekologijo kopenskih in vodnih ekosistemov, zgradbo in delovanjem ekosistemov ter vplivi človekovih dejavnosti na organizme in ekosisteme
- Študenta usposobiti za prepoznavanja obremenitev in vplivov na ekosisteme, iskanje rešitev ter ukrepov za izboljšanje stanja ekosistemov

Splošne kompetence:

- Sposobnost sinteze in povezovanja znanja s področja biologije in ekologije vodnih in kopenskih ekosistemov

Objectives and competences:

Specific competences:

- Students get acquainted with the ecology of terrestrial and aquatic ecosystems, the structure and function of ecosystems and impacts of human activities on organisms and ecosystems
- Qualify the students to be able to identify the pressures and impacts on ecosystems, to find solutions and measures to improve the state of ecosystems

General competences:

- Ability to summarise and integrate knowledge in the field of biology and ecology of aquatic and terrestrial ecosystems

Predvideni študijski rezultati:

Intended learning outcomes:

Znanje in razumevanje:

- razumevanje zgradbe in delovanja terestričnih in vodnih ekosistemov
- razumevanje, analiza in sinteza živih in neživih dejavnikov okolja
- vrednotenje človekovih obremenitev na ekosisteme
- razumevanje spremenjenih procesov v ekosistemih, ki so pod vplivom antropogenih obremenitev
- poznavanje ukrepov za izboljšanje stanja ekosistemov

Prenesljive/ključne spretnosti in drugi atributi:

- uporaba domače in tuje literature
- identifikacija obremenitev in reševanje problemov
- pisno in ustno poročanje o ukrepih za izboljšanje stanja v ekosistemih
- delo v manjših skupinah

Knowledge and Understanding:

- understanding the structure and function of terrestrial and aquatic ecosystems
- understanding, analysis and synthesis of biotic and abiotic environmental factors
- the evaluation of human pressures on ecosystems
- understanding of modified processes in ecosystems that are under the impact of human pressures
- knowledge of measures to improve the state of ecosystems

Transferable/Key Skills and other attributes:

- the use of domestic and international literature
- identification of pressures and problem solving
- written and oral reporting on measures to improve the state of ecosystems
- work in small groups

Metode poučevanja in učenja:**Oblike dela:**

- predavanja
- terenske vaje
- samostojno delo študentov

Metode dela:

- razlaga
- dialog, razprava
- aktivno delo v skupinah
- preučevanje praktičnih primerov
- ogled na terenu
- vključevanje strokovnjakov za posamezna področja
- priprava, predstavitev in zagovor seminarske naloge

Learning and teaching methods:**Forms of teaching:**

- in-class lectures
- field courses
- individual work of students

Teaching methods:

- explanation
- discussion, debate
- teamwork
- practical demonstration
- practise in the field
- involvement of experts in the specific fields
- preparation, presentation of a seminar paper

Načini ocenjevanja:

Delež (v %) /

Weight (in %) **Assessment:**

<p>Način (pisni izpit, ustno izpraševanje, naloge, projekt)</p> <ul style="list-style-type: none"> - pisni izpit - priprava, predstavitev in zagovor seminarske naloge <p>Na vajah je obvezna vsaj 90-odstotna prisotnost. Študent mora za pristop k izpitu izdelati in zagovarjati seminarsko nalogo.</p> <p>Ocenjevalna lestvica:</p> <ul style="list-style-type: none"> ▪ zadostno 6: 60-67% ▪ dobro 7: 68-75% ▪ prav dobro 8: 76-83% ▪ prav dobro 9: 84-90% ▪ odlično 10: 91-100% 	<p>100 %</p>	<p>Type (examination, oral, coursework, project):</p> <ul style="list-style-type: none"> - written exam - preparation, presentation and defence of seminar paper <p>At least 90% attendance at courses is required. Students must first prepare, present and defence the seminar paper, which is a prerequisite for final written exam.</p> <p>Grading system:</p> <ul style="list-style-type: none"> ▪ Sufficient D (6): 60-67% ▪ Good C (7): 68-75% ▪ Very good B (8): 76-83% ▪ Very good B+ (9): 84-90% ▪ Excellent A (10): 91-100%
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Materialni pogoji za izvedbo predmeta :

- predavalnica z multimedijско opremo
- računalniška učilnica

Material conditions for subject realization:

- classroom with the multimedia equipment
- computer classroom

Obveznosti študentov:

- Obvezna prisotnost na vajah
- Izdelana seminarska naloga, predstavitev in zagovor

Student's commitments:

- Mandatory attendance at courses
- Preparation, presentation and defence of seminar paper

Reference nosilca predmeta:

1. Pedagoško delo:
 - nosilec in izvajalec predmeta na dodiplomskem študiju (Ekosistemska biologija – VŠVO) in podiplomskem študiju (Ekologija in varstvo voda – VŠVO)
 - mentor diplomantom na dodiplomskem študiju
2. Raziskovalno delo:
 - Več kot 200 projektov
 - Vodja in sodelavec v številnih raziskovalnih projektih:
 - WWF Dinaric Arc Sustainable Hydropower Initiative (DASHI II), consultant service on "E-Flow (WWF European Policy, 2014-2015),
 - BeWater: Making society an active participant in water adaptation to global change (EU 7th Framework, 2013-2017)
 - AQUA-VET; Introducing Aquaponic in VET: Tools, teaching Units, and teacher training to implement the innovative instrument GLOBE (EU, Lifelong Learning Programme,

Lecturer's references:

1. Teaching:
 - Lecturer of subject at undergraduate level (Ecosystem biology – Environmental Protection College, Velenje) and postgraduate study (Ecology and Protection of Water - Environmental Protection College, Velenje)
 - Mentor to graduate students
2. Research work:
 - more than 200 projects
 - manager and co-worker in many international projects:
 - WWF Dinaric Arc Sustainable Hydropower Initiative (DASHI II), consultant service on "E-Flow (WWF European Policy, 2014-2015),
 - BeWater: Making society an active participant in water adaptation to global change (EU 7th Framework, 2013-2017)
 - AQUA-VET; Introducing Aquaponic in VET: Tools, teaching Units, and teacher training to implement the innovative instrument GLOBE (EU, Lifelong Learning Programme, 2012-2014)

2012-2014)

- A EUROpean training and research network for environmental FLOW management in river basins (MARIE SKŁODOWSKA-CURIE ACTIONS (Innovative Training Networks (ITN) Call: H2020-MSCA-ITN-2017 (2017 – 2021))

Pomembnejša raziskovalna dela:

- SMOLAR-ŽVANUT, Nataša, MADDOCK, Ian P., VRHOVŠEK, Danijel. Evaluation and application of environmental flows for running waters in Slovenia. *Int. j. water resour. dev.*, 2008, letn. 24, št. 4, str. 609-619, ilustr. [COBISS.SI-ID 4268897],
- SMOLAR-ŽVANUT, Nataša, MIKOŠ, Matjaž. The impact of flow regulation caused by hydropower dams on the periphyton community in the Soča River, Slovenia. *Hydrological sciences journal*, ISSN 0262-6667. [Printed.], 2014, letn. 59, št. 5, str. 1032-1045.
- KRIVOGRAD-KLEMENČIČ, Aleksandra, SMOLAR-ŽVANUT, Nataša, ISTENIČ, Darja, GRIESSLER BULC, Tjaša. Algal community patterns in Slovenian bogs along environmental gradients. *Biologia*, 2010, vol. 65, no. 3, str. 422-437.
- SMOLAR-ŽVANUT, Nataša, KRIVOGRAD-KLEMENČIČ, Aleksandra. Sprememba sestave fitobentosa po odvzemu vode za hidroelektrarne na Kokri in Selški Sori v slovenskih Alpah = Change in phytobenthos composition after water abstraction for hydroelectric power plants on the Kokra and the Selška Sora rivers in the Slovenian Alps. *Natura Sloveniae*, ISSN 1580-0814. [Tiskana izd.], 2011, letn. 13, št. 1, str. 5-23. http://web.bf.uni-lj.si/bi/NATURA-SLOVENIAE/pdf/NatSlo_13_1_1.pdf. [COBISS.SI-ID 4212843]
- VRHOVŠEK, Danijel, KOSI, Gorazd, KRIVOGRAD-KLEMENČIČ, Aleksandra, SMOLAR, Nataša. Monografija sladkovodnih in kopenskih alg v Sloveniji = Monograph on freshwater and terrestrial algae in Slovenia. Ljubljana: Založba ZRC, ZRC SAZU: Limnos, 2006. 172 str. ISBN 961-6568-48-5. ISBN 978-961-6568-48-7. [COBISS.SI-ID 228750080]
- SMOLAR-ŽVANUT, Nataša, KRIVOGRAD-KLEMENČIČ, Aleksandra. The impact of altered flow regime on periphyton. V: MADDOCK, Ian P. (ur.), et al. *Ecohydraulics : an integrated approach*. Chichester: Wiley Blackwell, 2013, str. 229-243, ilustr., doi:

- A EUROpean training and research network for environmental FLOW management in river basins (MARIE SKŁODOWSKA-CURIE ACTIONS (Innovative Training Networks (ITN) Call: H2020-MSCA-ITN-2017 (2017 – 2021))

Selected research publications:

- SMOLAR-ŽVANUT, Nataša, MADDOCK, Ian P., VRHOVŠEK, Danijel. Evaluation and application of environmental flows for running waters in Slovenia. *Int. j. water resour. dev.*, 2008, letn. 24, št. 4, str. 609-619, ilustr. [COBISS.SI-ID 4268897],
- SMOLAR-ŽVANUT, Nataša, MIKOŠ, Matjaž. The impact of flow regulation caused by hydropower dams on the periphyton community in the Soča River, Slovenia. *Hydrological sciences journal*, ISSN 0262-6667. [Printed.], 2014, letn. 59, št. 5, str. 1032-1045.
- KRIVOGRAD-KLEMENČIČ, Aleksandra, SMOLAR-ŽVANUT, Nataša, ISTENIČ, Darja, GRIESSLER BULC, Tjaša. Algal community patterns in Slovenian bogs along environmental gradients. *Biologia*, 2010, vol. 65, no. 3, str. 422-437.
- SMOLAR-ŽVANUT, Nataša, KRIVOGRAD-KLEMENČIČ, Aleksandra. Sprememba sestave fitobentosa po odvzemu vode za hidroelektrarne na Kokri in Selški Sori v slovenskih Alpah = Change in phytobenthos composition after water abstraction for hydroelectric power plants on the Kokra and the Selška Sora rivers in the Slovenian Alps. *Natura Sloveniae*, ISSN 1580-0814. [Tiskana izd.], 2011, letn. 13, št. 1, str. 5-23. http://web.bf.uni-lj.si/bi/NATURA-SLOVENIAE/pdf/NatSlo_13_1_1.pdf. [COBISS.SI-ID 4212843]
- VRHOVŠEK, Danijel, KOSI, Gorazd, KRIVOGRAD-KLEMENČIČ, Aleksandra, SMOLAR, Nataša. Monografija sladkovodnih in kopenskih alg v Sloveniji = Monograph on freshwater and terrestrial algae in Slovenia. Ljubljana: Založba ZRC, ZRC SAZU: Limnos, 2006. 172 str. ISBN 961-6568-48-5. ISBN 978-961-6568-48-7. [COBISS.SI-ID 228750080]
- SMOLAR-ŽVANUT, Nataša, KRIVOGRAD-KLEMENČIČ, Aleksandra. The impact of altered flow regime on periphyton. In: MADDOCK, Ian P. (Ed.), et al. *Ecohydraulics : an integrated approach*. Chichester: Wiley Blackwell, 2013, p. 229-243, ilustr., doi: 10.1002/9781118526576.ch13. [COBISS.SI-

10.1002/9781118526576.ch13. [COBISS.SI-ID 4612203]

- VERKERK, Pieter Johannes, SÁNCHEZ, Anabel, LIBBRECHT, Steven, BROEKMAN, Annelies, BRUGGEMAN, Adriana, DALY-HASSEN, Hamed, GIANNAKIS, Elias, JEBARI, Sihem, KOK, Kasper, KRIVOGRAD-KLEMENČIČ, Aleksandra, MAGJAR, Manca, MARTINEZ DE ARANO, Inazio, ROBERT, Nicolas, SMOLAR-ŽVANUT, Nataša, VARELA, Elsa, ZOUMIDES, Christos. A participatory approach for adapting river basins to climate change. *Water*, ISSN 2073-4441, dec. 2017, letn. 9, št. 12, str. 1-28, ilustr. <http://www.mdpi.com/2073-4441/9/12/958>, doi: [10.3390/w9120958](https://doi.org/10.3390/w9120958). [COBISS.SI-ID 8237665]

3. Strokovno delo

- Vodja oddelka za varstvo in rabo voda na Direkciji Republike Slovenije za vodo
- Izdelava več kot 100 strokovnih študij s področja ekologije voda

4. Priznanja in sodelovanjev mednarodnih organizacijah

- Članica slovenske komisije za velike pregrade, Slovenija
- Članica komiteja za okolje (predstavnik slovenske komisije za visoke pregrade) pri svetovni organizaciji International Commission on Large Dams

ID 4612203]

- VERKERK, Pieter Johannes, SÁNCHEZ, Anabel, LIBBRECHT, Steven, BROEKMAN, Annelies, BRUGGEMAN, Adriana, DALY-HASSEN, Hamed, GIANNAKIS, Elias, JEBARI, Sihem, KOK, Kasper, KRIVOGRAD-KLEMENČIČ, Aleksandra, MAGJAR, Manca, MARTINEZ DE ARANO, Inazio, ROBERT, Nicolas, SMOLAR-ŽVANUT, Nataša, VARELA, Elsa, ZOUMIDES, Christos. A participatory approach for adapting river basins to climate change. *Water*, ISSN 2073-4441, dec. 2017, letn. 9, št. 12, str. 1-28, ilustr. <http://www.mdpi.com/2073-4441/9/12/958>, doi: [10.3390/w9120958](https://doi.org/10.3390/w9120958). [COBISS.SI-ID 8237665]

3. Professional work:

- Managing the Department for Protection and Use of Water at Slovenian Water Agency
- Preparing more than 100 projects from the field of water ecology

4. Awards and participation in international organisations

- Member of Slovenian Committee of Large Dams, Slovenia
- Member of Committee on Environment (representative of Slovenian Committee of Large Dams at International Commission on Large Dams)