

**UČNI NAČRT PREDMETA / COURSE SYLLABUS**

<b>Predmet:</b>	PLITVI PODZEMELJSKI HABITATI: EKOLOGIJA, EVOLUCIJA IN NARAVOVARSTVO
<b>Course title:</b>	SHALLOW SUBTERRANEAN HABITATS: ECOLOGY, EVOLUTION, AND CONSERVATION

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 3rd level	Biodiversity and ecology		

**Vrsta predmeta / Course type**

Izbirni/ Elective

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

DIB08

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:**

Izr. prof. dr. Tanja Pipan

**Jeziki /  
Languages:**

**Predavanja /  
Lectures:**

slovenščina, angleščina / Slovene, English

**Vaje / Tutorial:**

slovenščina, angleščina / Slovene, English

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

Opravljena prva ali druga stopnja študija biologije ali druge naravoslovne smeri.

**Prerequisite:**

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

**Vsebina:**

Predmet obravnava naslednja poglavja z ožjega področja ekologije in biologije plitvih podzemeljskih habitatov (PPH): uvod v predstavitev posameznih tipov vodnih in kopenskih PPH: mežišča in hipotelminorjeični habitat, epikras, melišča in MSS habitat, hiporejik ter jame v lavi. Vsak habitat je predstavljen s posameznimi konkretnimi primeri povzetimi s celega sveta, podani so osnovni kemični in fizikalni parametri:

**Content (Syllabus outline):**

The following chapters from a narrow scope of ecology and biology of shallow subterranean habitats (SSHs) are included: introduction of different types of aquatic and terrestrial SSHs: seepage springs and the hypotelminorheic habitat, epikarst, talus slopes and MSS habitat, hyporheic and lava tubes. Each habitat is presented using examples from all over the world, basic chemical and physical parameters are given: hydrology, evolution,

hidrologija, evolucija, geografski obseg, analogije z drugimi habitati, ter biološke značilnosti: organski ogljik, zgodovinski vidiki bioloških raziskav, metodologija vzorčenja favne, diverziteteta in ekologija, morfološke značilnosti in adaptacije, biogeografija.

geographic scope, analogues with other habitats, and biological characteristics: organic carbon, history of biological studies, methods for collecting fauna, diversity and ecology, morphology and adaptations, biogeography.

**Temeljni literatura in viri / Readings:**

- Culver, D. C., & Pipan, T. (2014). *Shallow Subterranean Habitats. Ecology, Evolution, and Conservation*. Oxford University Press, Oxford.
- Culver, D. C., & Pipan, T. (2009). *The Biology of Caves and Other Subterranean Habitats*. Oxford University Press, Oxford.
- Pipan, T. (2005). *Epikarst – a promising habitat. Copepod fauna, its diversity and ecology: a case study from Slovenia (Europe)*. Založba ZRC, Ljubljana.
- White, W. B., & Culver, D. C. (2012). *Encyclopedia of Caves*. Izbrana poglavja/Selected chapters. Second Edition. Elsevier, Amsterdam.
- Izbrani članki iz znanstvenih revij. / Selected articles from scientific journals.

**Cilji in kompetence:**

Cilj predmeta je podati študentom poznavanje vodnih in kopenskih tipov plitvih podzemeljskih habitatov, razumevanje in poznavanje osnovnih fizikalno kemijskih in bioloških razlik med globokimi in plitvimi podzemeljskimi habitati, razumevanje biologije, ekologije in evolucije plitvih podzemeljskih habitatov (PPH) ter osnovne naravovarstvene vidike PPH. Študenti razvijajo sposobnost prepoznavanja osnovnih ekoloških razlik med globokimi in plitvimi podzemeljskimi habitati, osvojijo osnovna načela pridobivanja ekoloških podatkov v PPH in njihove interpretacije. Usposobijo se za ekološko raziskovalno delo v PPH.

**Objectives and competences:**

The main goal of this course is to provide students with knowledge of aquatic and terrestrial types of shallow subterranean habitats, understanding of basic physico-chemical and biological differences between deep and shallow subterranean habitats, understanding of biology, ecology, and evolution of shallow subterranean habitats (SSHs) and their conservation aspects. Students develop the ability to recognize basic ecological differences between deep and shallow subterranean habitats, acquire the basic principles of obtaining ecological data in SSHs and their interpretation. They are trained to execute ecological investigations in SSHs.

**Predvideni študijski rezultati:**

Študenti pridobijo teoretično in praktično znanje o kopenskih (epikras, melišča, MSS, jame v lavi) ter vodnih plitvih podzemeljskih habitatih (mezišča, epikras, vodonosniki v karbonatih, hiporejik), njihovih fizikalno kemijskih in bioloških parametrih, temelječih na konkretno prikazanih meritvah in primerih, odvisnosti podzemeljskih habitatov od površja, ekologiji, biologiji in evoluciji PPH ter značilni favni. Študenti poznajo nove pristope v smeri raziskovanja biologije in ekologije plitvih podzemeljskih habitatov,

**Intended learning outcomes:**

Students obtain theoretical and practical knowledge about terrestrial (epikarst, talus slopes, MSS, lava tubes) and aquatic shallow subterranean habitats (hypotelminorheic, epikarst, calcrete aquifers, hyporheic), their physico-chemical and biological characteristics, based on the measurements of specific cases, dependence of subterranean habitats from surface, ecology, biology and evolution of SSHs, and specific fauna. Students get familiar with new approaches in direction of biological and ecological research in shallow subterranean habitats, new methodology of

nove metodologije vzorčenja, standardizacije rezultatov in baz podatkov.

sampling, standardization of results and databases.

**Metode poučevanja in učenja:**

- Predavanja
- Terenska predavanja
- Individualno delo na izbrani raziskavi in predstavitev v seminarski obliki
- e-učenje

**Learning and teaching methods:**

- Lectures
- Field lectures
- Individual work on a selected investigation and its presentation as a seminar work
- e-learning

**Načini ocenjevanja:**

- Kratka seminarska naloga, njena predstavitev
- Izpit

Delež (v %) /  
Weight (in %)

**Assessment:**

- Short written seminar and its presentation
- Examination

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

1. Pipan, T., Christman, M., Culver, D. C. (2020). Abiotic community constraints in extreme environments : epikarst copepods as a model system. *Diversity*, 12(7), 16 str.
2. Kozel, P., Pipan, T. (2020). Specialized aquatic subterranean communities are probably most species-rich in the thickest epikarst. *Limnologica*, 81, 1-9.
3. Pilotto, F., Kühn, I., Adrian, R., Alber, R., Alignier, A., Andrews, C., Bäck, J., Barbaro, L., Beaumont, D., Beenaerts, N., Pipan, T., et al. (2020). Meta-analysis of multidecadal biodiversity trends in Europe. *Nature communications*, 11, 11 str.
4. Culver, D. C., & Pipan, T. (2019). *The biology of caves and other subterranean habitats*. Oxford University Press, USA.
5. Pipan, T., Petrič, M., Šebela, S., & Culver, D. C. (2019). Analyzing climate change and surface-subsurface interactions using the Postojna Planina Cave System (Slovenia) as a model system. *Regional environmental change*, 19(2), 379-389.
6. Mammola, S., Piano, E., Cardoso, P., Vernon, P., Domínguez-Villar, D., Culver, D. C., Pipan, T., Isaia, M. (2019). Climate change going deep : the effects of global climatic alterations on cave ecosystems. *The anthropocene review*, 2019, 19 str.