Univerza v Mariboru

Fakulteta za naravoslovje in matematiko

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	**Speleobiologija**
Course title:	Speleobiology

Študijski program in stopnja **Study programme and level**	**Študijska smer** **Study field**	**Letnik** **Academic year**	**Semester** **Semester**
Univerzitetni študijski program Ekologija z naravovarstvom, 1. stopnja		**3**	**3 ali 4**
Undergraduate university programme Ecology with Nature Conservation, 1st degree		**3**	**3 or 4**

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	**10**		**4**	**16**	**135**	**6**

Nosilec predmeta / Lecturer:	Tone NOVAK

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

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisits:**
Jih ni.	No.

Vsebina:

- Uvod v speleobiologijo.
- Jame, špranje, umetni rovi, podzemeljsko površinsko okolje, tla
- Izviri, intersticialno okolje, hipotelminoreik, jezerske in morske globine, morske jame
- Troglomorfoze: velikost trupa in okončin, anoftalmija, depigmentiranost, apterizem, fizogastrija, psevdofizogastrija
- Troglobionti, troglofili, troglokseni; freatobionti; stigobionti
- Pregled organizmov v podzemlju: prokarioti; glive; rastline; živali
- Porifera, Protozoa, Cnidaria, Turbellaria, Nemertea, Nematoda, Mollusca, Polychaeta, Oligochaeta, Hirudinea, Chelicerata, Crustacea, Myriapoda, Insecta, Vertebrata
- Geografska razširjenost podzemeljskih živali
- Fiziologija in etologija podzemeljskih živali
- Evolucija podzemeljskih živali
- Slovenija kot država z največjo diverziteto podzemeljskih taksonov v svetovnem merilu
- Pregled najvažnejših podzemeljskih živali
- Vpliv turizma na podzemeljsko favno
- Zaščita in varovanje podzemeljskih habitatov

Content (Syllabus outline):

- Introduction into speleobiology
- Caves, fissures, artificial tunnels, shallow subterranean environments, soils
- Springs, interstitial environment, hipothelminoreic environment, deep lake and deep sea regions, marine caves
- Troglomorphoses: body and appendages size, anophthalmy, apterism, physogastry, pseudophysogastry
- Troglobionts, troglophiles, trogloxenes; freatobionts; stygobionts
- Review of organisms in the subterranean environments: Procaryota, Fungi, Plants, Animals
- Porifera, Protozoa, Cnidaria, Turbellaria, Nemertea, Nematoda, Mollusca, Polychaeta, Oligochaeta, Hirudinea, Chelicerata, Crustacea, Myriapoda, Insecta, Vertebrata
- Geographical distribution of the hypogean organisms
- Physiology and ethology of the subterranean organisms
- Evolution of the subterranean organisms
- Slovenia as the state with the highest diversity of the subterranean organisms in the World
- Review of the most prominent subterranean animals
- Impact of tourism on subterranean fauna
- Protection and conservation of subterranean fauna

Temeljni literatura in viri / Readings:

• Culver D. C., Christman M. C., Sket B., Trontelj P., 2004. Sampling adequacy in an extreme environment: species richness patterns in Slovenian caves. Biodiversity and Conservation, 13: 1209- 1229.

• Culver D. C., Pipan T., 2019. The biology of caves and other subterranean habitats, second edition. Oxford Univ. Press, Oxford, New York.

• Culver, D. C., W. B. White (eds.), 2012: Encyclopedia of caves. Elsevier/Academic Press, Amsterdam/Boston.

• Gunn, J., 2004: Encyclopedia of caves and karst science. Taylor & Francis Books Inc., New York/London.

• Juberthie, C. & V. Decu (eds.), 1992-1996: Encyclopaedia biospeologica I-III. Societé de biospéologie, Moulis, Bukarest.

• Kozel, P., Pipan, T., Šajna, N., Polak, S., Novak, T. (2017) Mitigating the conflict between pitfall-trap sampling and conservation of terrestrial subterranean communities in

caves. *International journal of speleology,* 46(3),359–368. doi: 10.5038/1827-806X.46.3.2123.
• Kozel, P., Pipan, T., Mammola, S., Culver, D. C., Novak, T. (v tisku) Distributional dynamics of a specialized subterranean community oppose the classical understanding of the preferred subterranean habitats. Invertebrate biology.
• Moldovan, O. T., Kováč, L., Halse, S. (Eds.) (2018). Cave ecology. Springer International Publishing. 545 str.
• Pipan, T., Culver, D. C., Papi, F., Kozel, P. (2018) Partitioning diversity in subterranean invertebrates : the epikarst fauna of Slovenia. PloS ONE 13(5), 1-19. doi: 10.1371/journal.pone.0195991.
• Sket B., Paragamian K., Trontelj P., 2004. A census of the obligate subterranean fauna of the Balkan peninsula. In: Griffiths H. I., B. Kryštufek (eds.): Balkan Biodiversity. Pattern and Process in Europe's Biodiversity Hotspot. Kluwer Academic Publishers: 309-322.

Cilji in kompetence:

- Podati pregled tipov in značilnosti podzemeljskih habitatov
- Podati pregled tipov in značilnosti podzemeljskih organizmov
- Predstaviti poseben status Slovenije glede diverzitete podzemeljskih taksonov

Objectives and competences:

- To give an overwiev of typology and characteristics of subterranean habitats
- To give an overwiev of typology and characteristics of subterranean organisms
- To present the prominent position of Slovenia for the diversity of the subterranean taxa

Predvideni študijski rezultati:

Znanje in razumevanje:

- Ekološke značilnosti podzemeljskih habitatov
- Biotske značilnosti podzemeljskih organizmov
- Zgodovina speleobiologije in trendi modernih znanstvenih raziskav
- Poznavanje osnovnih vzorčevalnih metod v podzemeljskih habitatih
- Prepoznavanje troglomorfoz in troglomorfoznih organizmov
- Usposobljenost za biološko raziskovalno delo v podzemeljskih votlinah

Intended learning outcomes:

Knowledge and understanding:

- Ecological characteristics of subterranean habitats
- Biotic characteristics of subterranean organisms
- The history of speleobiology and modern trends of scientific investigations
- Knowledge about the elementary sampling methods in subterranean habitats
- Recognition of troglomorphoses and troglomorphotic organisms
- Capability of biological investigations in cavities

Metode poučevanja in učenja:

Learning and teaching methods:

• Predavanja • Laboratorijske vaje • Terenske vaje • Seminar	• Lectures • Laboratory work • Field work • Seminar

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Način (pisni izpit, ustno izpraševanje, naloge, projekt) • Seminarska naloga • Pisni izpit	 20 80	Type (examination, oral, coursework, project): • Seminar • Written exam

Reference nosilca / Lecturer's references:

- Kozel P., Pipan T., Šajna N., Polak S, Novak T., 2017. Mitigating the conflict between pitfall-trap sampling and conservation of terrestrial subterranean communities in caves. International Journal of Speleology 46(3).
- Lipovšek, S., Janžekovič, F., Novak, T., 2017. Ultrastructure of fat body cells and Malpighian tubule cells in overwintering Scoliopteryx libatrix (Noctuoidea). Protoplasma, DOI 10.1007/s00709-017-1110-3
- Lipovšek, S., Novak, 2016. Autophagy in the fat body cells of the cave cricket Troglophilus neglectus Krauss, 1878 (Rhaphidophoridae, Saltatoria) during overwintering. Protoplasma. pp. 10. DOI 10.1007/s00709-015-0824-3
- Novak, T., Kozel, P., 2014. Hadzinia ferrani, sp. n. (Opiliones: Nemastomatidae), a highly specialized troglobiotic harvestman from Slovenia. Zootaxa 3841(1), 135−145. http://biotaxa.org/Zootaxa/login?source=%2FZootaxa%2Farticle%2Fview%2Fzootaxa.3841.1.8%2F9353&loginMessage=reader.subscriptionRequiredLoginText
- Novak, T., Šajna, N., Antolinc, E., Lipovšek, S., Devetak, D., Janžekovič, F., 2014. Cold tolerance in terrestrial invertebrates inhabiting subterranean habitats. International Journal of Speleology 43(3), 265−272. http://scholarcommons.usf.edu/ijs/vol43/iss3/3