



Univerza v Mariboru

Fakulteta za naravoslovje
in matematiko

UČNI NAČRT PREDMETA / COURSE SYLLABUS

Predmet:	Izbrana poglavja iz speleobiologije
Course title:	Selected Topics in Speleobiology

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.; 1st or 2nd	1.- 4.; 1st-4th
Doctoral Study Ecological Sciences, 3rd degree			

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
3	3		5	9	160	6

Nosilec predmeta / Lecturer: Tone NOVAK

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

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

Poznavanje organizmov in ekologije na ravni univerzitetnega programa

Prerequisites:

Knowledge of organisms and ecology at graduate level

Vsebina:

Obravnavana so izbrana poglavja iz naslednjih sklopov.
Podzemeljski habitati so naravne in umetne votline. S slovenskega ozemlja sta opisana prvi podzemeljski vretenčar, človeška ribica, ter prvi nevretenčar, hrošč drobnovratnik. Oris zgodovine speleobiologije, ki so jo zasnovali raziskovalci na slovenskem ozemlju. Pregled splošnih fizicnih razmer v podzemeljskih

Content (Syllabus outline):

Selected topics in the following chapters are discussed.
Hypogean habitats are natural and artificial cavities. In the territory of Slovenia, the first vertebrate: the olm, and the first invertebrate: the bittle slender-neck, have been described. A concise historical review of the speleobiology, which had started in the territory of Slovenia. The overview of general physical

habitatih ter pregled splošnih značilnosti podzemeljskih živih bitij. Ekološke razmere v posameznih podzemeljskih tipih habitatov (naravne in umetne votline, epikras). Troglokseni, troglofili, troglobionti; freatokseni, freatofili, freatobionti. Specifične ekološke, morfološke, fiziološke in citološke prilagoditve na podzemeljske habitate. Na terenu in v laboratoriju so prikazani vzori za ekološke raziskave podzemeljskih habitatov.

characteristics of the hypogean habitats, and the review of general characteristics of the hypogean organisms. Ecological circumstances in hypogean habitat types (natural and artificial cavities, epikarst). Troglloxenes, troglophile, troglobionts; phreatoxenes, phreatofiles, phreatobiont. Specific ecological, morphological, physiological and cytological adaptation to hypogean habitats. In field and in the laboratory, some examples of ecological investigations in hypogean habitats are presented.

Temeljni literatura in viri / Readings:

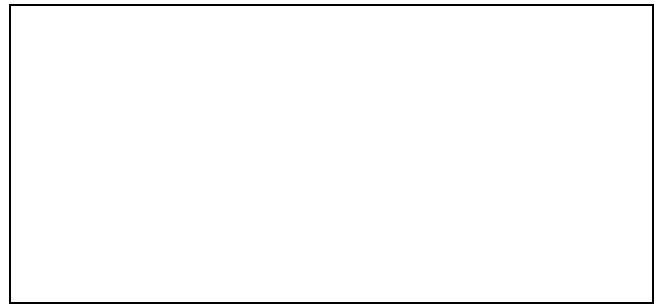
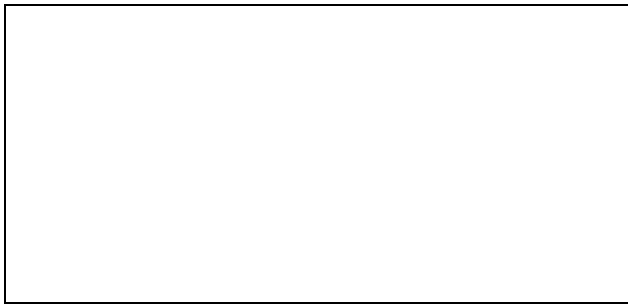
- Culver D. C., Christman M. C., Sket B., Trontelj P., 2004. Sampling adequacy in an extreme environment: species richness patterns in Slovenian caves. *Biodiversity and Conservation*, 13: 1209- 1229.
- Culver D. C., Pipan T., 2009. *The biology of caves and other subterranean habitats*. Oxford Univ. 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*. Societ  de biosp ologie, Moulis, Bukarest.
- 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 podroben pregled tipov in značilnosti podzemeljskih habitatov
- Podati podroben pregled tipov in značilnosti podzemeljskih organizmov
- Podrobno predstaviti zgodovino speleobiologije in modernih trendov v njej
- Podrobno pojasniti osnovne ekološke razmere v podzemeljskih habitatih
- Podrobno prikazati izbrane metode ekološkega vzorcevanja v jamah

Objectives and competences:

- To give an advanced overview of typology and characteristics of hypogean habitats
- To give an advanced overview of typology and characteristics of hypogean organisms
- To present advanced knowledge about the history and modern trends in speleobiology
- To explain in detail ecological circumstances in hypogean habitats
- To present in detail selected ecological sampling methods in caves

**Predvideni študijski rezultati:****Znanje in razumevanje:**

- Poglobljeno razumevanje ekoloških značilnosti podzemeljskih habitatov
- Poglobljeno razumevanje biotskih značilnosti podzemeljskih organizmov
- Podrobna zgodovina speleobiologije in trendi modernih znanstvenih raziskav
- Poglobljeno poznavanje vzorcevalnih metod v podzemeljskih habitatih

Prenesljive/ključne spretnosti in drugi atributi:

- Podrobno razpoznavanje troglomorfnih znakov
- Usposobljenost za zahtevno ekološko raziskovalno delo v podzemeljskih votlinah

Metode poučevanja in učenja:

- Predavanja
- Laboratorijske vaje
- Terenske vaje
- Individualno načrtovanje izbrane raziskave

Intended learning outcomes:**Knowledge and understanding:**

- Advanced understanding of ecological characteristics of hypogean habitats
- Advanced understanding of biotic characteristics of hypogean organisms
- Advanced history of speleobiology and modern trends of scientific investigations
- Advanced knowledge about the elementary sampling methods in hypogean habitats

Transferable/Key Skills and other attributes:

- Advanced recognition of troglomorphoses
- Capability of top-level ecological investigations in cavities

Learning and teaching methods:

- Lectures
- Laboratory excersises
- Field excersises
- Individual planning of a selected investigation

Delež (v %) /

Weight (in %)

Načini ocenjevanja:**Assessment:**

- Individualni raziskovalni projekt – pisni in ustna predstavitev
- Pisni izpit

50 %
50%

- Individual project work – written, and oral presentation
- 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). In print.
- 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>