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: **Peter KOZEL**

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

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

Vsaka izmed naštetih obveznosti v načinih ocenjevanja mora biti opravljena s pozitivno oceno.

Prerequisits:

Each of the mentioned commitments must be assessed with a passing grade.

Vsebina:

Content (Syllabus outline):

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 značilnih fizičnih razmer v podzemeljskih 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.	Selected topics in the following chapters are discussed. Hypogean habitats are natural and artificiel cavities. In the terriotry of Slovenia, the first vertebrate: the olm, and the first avertebrate: the bittle slender-neck, have been described. A consize historical review of the speleobiology, which had started in the territory of Slovenia. The overview of general physical characteristics of the hypogean habitats, and the review of general characteristics of the hypogean organisms. Ecological circumstances in hypogean habitat types (natural and artificiel cavities, epikarst). Trogloxenes, 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., & Pipan, T. (2019) The biology of caves and other subterranean habitats (2nd ed., str. XX, 301). Oxford University Press. doi:10.1093/oso/9780198820765.001.0001
- *Encyclopedia of caves* (3rd ed., str. XXXII, 1225). Academic Press, an imprint of Elsevier.
- Kozel, P., Novak, T., Janžekovič, F., Lipovšek, S. (2023). Starvation hardiness as preadaptation for life in subterranean habitats. *Scientific reports*, 13, 9643. https://doi.org/10.1038/s41598-023-36556-9

Dodatna literatura:

- *Cave ecology* (Let. 235, str. vii, 545). (2019). Springer. https://link.springer.com/book/10.1007/978-3-319-98852-8
- *Encyclopedia of caves and karst science* (str. XVIII, 902). (2004). Fitzroy Dearborn.
- *Encyclopaedia biospeologica* (str. Zv. <1-3>). (1994). C.N.R.S.; Academie Roumaine.

Cilji in kompetence:	**Objectives and competences:**
• 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	• 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

• Podrobno pojasniti osnovne ekološke razmere v podzemeljskih habitatih • Podrobno prikazati izbrane metode ekološkega vzorcevanja v jamah	speleobiology • To explain in detail ecological circumstances in hypogean habitats • To present in detail selected ecological sampling methods in caves

Predvideni študijski rezultati:	**Intended learning outcomes:**
Študenti razumejo ključne ekološke značilnosti podzemeljskih habitatov in podzemeljskih organizmov. Podrobno poznajo zgodovino speleobiologije in trende modernih znanstvenih raziskav. Poznajo specifične vzorčevalne metod v podzemeljskih habitatih. Sposobni so natančno opredeliti specialne morfološke, fiziološke, etološke in druge prilagoditve živali v podzemeljskih habitatih. Usposobijo se za zahtevno ekološko znanstveno-raziskovalno delo v podzemeljskih votlinah.	Students understand crucial ecological characteristics of hypogean habitats and hypogean organisms. They are able to explain in the history of speleobiology and modern trends of scientific investigations. Students gain advanced knowledge on specific sampling methods in hypogean habitats. They are able to define special morphological, physiological, ethological and other adaptations of animals to hypogean habitats. Students are trained to conduct advanced ecological scientific research in hypogean cavities.

Metode poučevanja in učenja:	**Learning and teaching methods:**
• Predavanja • Laboratorijske vaje • Terenske vaje • Individulano načrtovanje izbrane raziskave	• Lectures • Laboratory excersises • Field excersises • Individual planning of a selected investigation

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
•Raziskovalna naloga	50 %	•Research paper
•Pisni izpit	50 %	•Written exam

Reference nosilca / Lecturer's references:

Lipovšek, S., Vajs, T., Dariš, B., Novak, T., Kozel, P., 2025. Autophagic activity in the midgut cells of three arachnids responds selectively to different modes of overwintering in caves. Protoplasma. doi: 10.1007/s00709-024-02009-x

Klenovšek, Tina, Polak, Slavko, Janžekovič, Franc, Novak, Tone, Kozel, Peter. Mandibular morphology in Leptodirini beetles (Leiodidae: Cholevinae) shows habitat-specific disparity across the karstic vertical profile. Zoological journal of the Linnean Society. 205,1, zlaf127.doi: 10.1093/zoolinnean/zlaf127

Kozel, P., Novak, T., Janžekovič, F., Lipovšek, S., 2023. Starvation hardiness as preadaptation for life in subterranean habitats. Scientific reports, 13: 9643. doi: 10.1038/s41598-023-36556-9