

**UČNI NAČRT PREDMETA / COURSE SYLLABUS**

|                      |                               |
|----------------------|-------------------------------|
| <b>Predmet:</b>      | KRAS IN TEKTONSKE STRUKTURE   |
| <b>Course title:</b> | KARST AND TECTONIC STRUCTURES |

| Študijski program in stopnja<br>Study programme and level   | Študijska smer<br>Study field | Letnik<br>Academic year | Semester<br>Semester |
|---|-------------------------------|-------------------------|----------------------|
| Vede o Zemlji in okolju,<br>magistrski študij 2. stopnje    | Krasoslovje                   | 2                       | 1                    |
| Earth and Environmental<br>Sciences, Master study 2nd level | Karstology                    | 2                       | 1                    |

**Vrsta predmeta / Course type** Izbirni/Elective

**Univerzitetna koda predmeta / University course code:** MIK02

| Predavanja<br>Lectures | Seminar<br>Seminar | Sem. vaje<br>Tutorial | Lab. vaje<br>Laboratory<br>work | Teren. vaje<br>Field work | Samost. delo<br>Individ. work | ECTS |
|------------------------|--------------------|-----------------------|---------------------------------|---------------------------|-------------------------------|------|
| 20                     | 20                 | 15                    |                                 | 10                        | 85                            | 6    |

**Nosilec predmeta / Lecturer:** Stanka Šebela

**Jeziki / Predavanja / Lectures:** angleščina/English/slovenščina/Slovenian  
**Languages: Vaje / Tutorial:** angleščina/English/slovenščina/Slovenian

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

Končan študijski program 1. stopnje ali dodiplomski študijski program za pridobitev univerzitetne izobrazbe, sprejet pred 11. 6. 2004 s področja naravoslovja.

**Prerequisites:**

First-cycle Bologna degree or a university degree in the natural sciences.

**Vsebina:**

- Osnove in metodologija raziskav tektonskih struktur,
- slovenske kraške jame in tektonske strukture,
- površinski kraški pojavi in tektonske strukture,
- tektonske strukture in kras v svetu,
- aktivna tektonika in kras.

**Content (Syllabus outline):**

- Fundamentals and methodology of research of tectonics deformations;
- Slovene karst caves and tectonic structures;
- Surface karst features and tectonic structures;
- Tectonic structures and karst in the World;
- Active tectonics and karst.

**Temeljni literatura in viri / Readings:**

- Čar, J. & Gospodarič, R., 1984. O geologiji krasa med Postojno, Planino in Cerknico. Acta carsologica 12 (1983): 91-106.
- Palmer, A.N., 2007. Cave Geology. Cave Book, Ohio, 454 str. (poglavja/chapters: Cavernous rocks, Influence of cave geology on cave patterns, Geologic studies of caves)
- Šebela, S., 1989. Tektonska zgradba sistema Postojnskih jam. Zbirka ZRC 18. Ljubljana: 112 str.
- Moores E.M, & Twiss R.J, 1995. Tectonics. W.H. Freeman and Company, New York: 415 str. (poglavja/chapters: Introduction, Transform Faults, Strike-Slip Faults, and Related Fracture Zones, Collisions).
- Zang A. & Stephansson, O., 2010. Stress Field of the Earth's Crust. Springer: 240 str. <http://dx.doi.org/10.1007/978-1-4020-8444-7> (poglavja/chapters: Introduction).
- Blatnik, M, Culver, D C., Gabrovšek, F, Knez, M, Kogovšek, B, Kogovšek, J, Liu, H, Mayaud, C, Mihevc, A, Mulec, J, Aljančič, M, Otoničar, B, Petrič, M, Pipan, T, Prelovšek, M, Ravbar, N, Shaw, T R., Slabe, T, Šebela, S, Zupan Hajna, N, Knez, M (Urednik), Otoničar, B (Urednik), Petrič, M (Urednik), Pipan, T (Urednik), Slabe, T (urednik). Karstology in the classical karst, (Advances in karst science). Cham: Springer, cop. 2020. XII, 222 str., doi: 10.1007/978-3-030-26827-5. (poglavja/chapters: Structura-Geological Mapping of Karst Areas).

#### **Cilji in kompetence:**

Kras je za Slovenijo ena najbolj prepoznavnih pokrajin, saj predstavlja 43 % ozemlja. Ker leži Slovenija na stiku Evrazijske plošče in Jadranske mikro-plošče, je razvoj krasa močno povezan s tektonskim dogajanjem. Kraški pojavi in voda v krasu pa sledijo predvsem tektonskim strukturnim značilnostim. Zato je pomembno spoznati osnove nastanka tektonskih struktur ter oblikovanje in nastanek kraških pojavov (površinskih in podzemeljskih) glede na te strukture. Vsi večji jamski sistemi v Sloveniji kažejo veliko odvisnost od tektonskih struktur, ki so se oblikovale pri narivanju, gubanju in prelamljanju. Zato mora študent razumeti teorijo nastanka tektonskih struktur, kot tudi povezavo s kraškimi oblikami in zakrasevanjem.

#### **Objectives and competences:**

Karst is one of the most recognized areas for Slovenia because it covers 43 % of the territory. Due to the fact that Slovenia is situated on the contact between Eurasia plate and Adria micro-plate, development of karst is strongly connected with active tectonic activity. Karst features and water in karst mostly follow tectonic structural characteristics. It is thus important to recognize the bases of the formation of tectonic structures and origin and formation of karst features (surface and underground) regarding such structures. All Slovenia's bigger karst systems are showing high dependence on tectonic structures that formed during thrusting, folding and faulting. In this sense the student has to understand the theory of the formation of tectonic structures, as well as their connection with karst features and karstification.

#### **Predvideni študijski rezultati:**

Študent je na terenu sposoben razlikovati med različnimi tektonskimi strukturami. Seznanjen je s konkretnimi primeri vpliva tektonskih struktur na zakrasevanje, predvsem za primere iz Postojnske jame, Predjame in Škocjanskih jam. Hkrati je seznanjen tudi z drugimi pomembnejšimi primeri iz sveta npr. iz južne Kitajske, ZDA in evropskih dežel. Z osvojenim znanjem je študent sposoben po literaturi in z

#### **Intended learning outcomes:**

The student is capable to distinguish between different tectonic structures on the field. Student is aware of concrete examples about influence of tectonic structures on karstification, especially for examples of Postojna Cave, Predjama and Škocjan Caves. At the same time student has knowledge about other important Worldwide cases as from south China, USA and European countries. With

lastnimi raziskavami na terenu ovrednotiti tektonske strukture in njihov vpliv na zakrasevanje.

gained knowledge the student is capable, with the help of literature and own field studies, to evaluate tectonic structures and their influence on karstification.

#### Metode poučevanja in učenja:

- Predavanja,
- vaje pod vodstvom nosilca predmeta,
- terensko delo pod vodstvom nosilca predmeta,
- individualno delo pod vodstvom nosilca predmeta,
- seminarji (predstavitve in interpretacija rezultatov, ki jih študentje podajo v seminarski obliki).

#### Learning and teaching methods:

- Lectures;
- Exercises under supervision of the lecturer responsible for the course;
- Field work under supervision of the lecturer responsible for the course;
- Individual work under supervision of the lecturer responsible for the course;
- Seminar work (Presentation and interpretation of results, which are presented by students as seminar work).

| Načini ocenjevanja:                                      | Delež (v %) /<br>Weight (in %) | Assessment                                     |
|--|--------------------------------|--|
| Način (pisni izpit, ustno izpraševanje, naloge, projekt) |                                | Type (examination, oral, coursework, project): |
| - Izpit,   | <b>90</b>                      | - Exam;  |
| - seminarska naloga.                                     | <b>10</b>                      | - Written paper.                               |

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

- PIPAN, T., PETRIČ, M., **ŠEBELA, S.**, CULVER, D. C. Analyzing climate change and surface-subsurface interactions using the Postojna Planina Cave System (Slovenia) as a model system. *Regional environmental change*, 19, 2, (2019): 379-389. <https://link.springer.com/article/10.1007/s10113-018-1349-z>, doi: 10.1007/s10113-018-1349-z.
- KALENDA, P., TENGLER, R., **ŠEBELA, S.**, BLATNIK, M., GOSAR, A. Detection of Divaška Jama corridors behind (to the SW) Trhlovca cave using low frequency high power ground penetrating radar. *Acta carsologica*, 47/ 2-3, (2018): 153-167, <https://ojs.zrc-sazu.si/carsologica/article/view/5187/6602>, doi: 10.3986/ac.v47i2-3.5187.
- PRELOVŠEK, M., **ŠEBELA, S.**, TURK, J. Carbon dioxide in Postojna Cave (Slovenia): spatial distribution, seasonal dynamics and evaluation of plausible sources and sinks. *Environmental earth sciences*, 77/7, (2018): 1-15, doi: 10.1007/s12665-018-7459-6.
- **ŠEBELA, S.**, TURK, J. Črna Jama as a cold air trap cave within Postojna Cave, Slovenia. *Theoretical and applied climatology*, 134/3-4, (2018): 741-751, <https://link.springer.com/article/10.1007/s00704-017-2304-5>, doi: 10.1007/s00704-017-2304-5.
- KACHALIN, I., LIASHCHUK, O., **ŠEBELA, S.** Periodical measurements of VLF radio signals and noise sounds in Črna Jama (Postojnska Jama) *Acta carsologica*, 46/1, (2017): 125-132, <https://ojs.zrc-sazu.si/carsologica/article/view/1950/4751>, doi: 10.3986/ac.v46i1.1950.
- **ŠEBELA, S.**, ZUPANČIČ, N., MILER, M., GRČMAN, H., JARC, S. Evidence of Holocene surface and near-surface palaeofires in karst caves and soils. *Palaeogeography, palaeoclimatology, palaeoecology*, 485, (2017): 224-235, doi: 10.1016/j.palaeo.2017.06.015.

- MIHEVC, A., GABROVŠEK, F., KNEZ, M., KOZEL, P., MULEC, J., OTONIČAR, B., PETRIČ, M., PIPAN, T., PRELOVŠEK, M., SLABE, T., **ŠEBELA, S.**, ZUPAN HAJNA, N. Karst in Slovenia. *Boletín geológico y minero*, 127/1, (2016): 79-97, [http://www.igme.es/boletin/2016/127\\_1/BG\\_127-1\\_Art-6.pdf](http://www.igme.es/boletin/2016/127_1/BG_127-1_Art-6.pdf).
- BRIESTENSKÝ, M., ROWBERRY, M. D., STEMBERK, J., STEFANOV, P., VOZÁR, J., **ŠEBELA, S.**, PETRO, L., BELLA, P., GAÁL, L., ORMUKOV, C. Evidence of a plate-wide tectonic pressure pulse provided by extensometric monitoring in the Balkan Mountains (Bulgaria). *Geologica Carpathica: international geological journal*, 66/5, (2015): 427-438, doi: 10.1515/geoca-2015-0035.
- **ŠEBELA, S.** Postojna - Planina Cave System, Slovenia. V: WHITE, W. B. (ur.), CULVER, D. C. (ur.), PIPAN, T. (ur.). *Encyclopedia of caves*. 3rd ed. London [etc.]: Academic Press, an imprint of Elsevier. cop. 2019, pp. 812-821.
- BLATNIK, M., CULVER, D. C., GABROVŠEK, F., KNEZ, M., KOGOVSĚK, B., KOGOVSĚK, J., LIU, H., MAYAUD, C., MIHEVC, A., MULEC, J., ALJANČIČ, M., OTONIČAR, B., PETRIČ, M., PIPAN, T., PRELOVŠEK, M., RAVBAR, N., SHAW, T. R., SLABE, T., **ŠEBELA, S.**, ZUPAN HAJNA, N., KNEZ, M. (ur.), OTONIČAR, B. (ur.), PETRIČ, M. (ur.), PIPAN, T. (ur.), SLABE, T. (ur.). *Karstology in the classical karst, (Advances in karst science)*. Cham: Springer, cop. 2020. XII, 222 pp, doi: 10.1007/978-3-030-26827-5.