



UNIVERSITY OF SARAJEVO – FACULTY OF SCIENCE
DESCRIPTION OF TEACHING COURSE

Form SP2

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Code: GE-461-4	Teaching course: KARST AREAS AND THEIR PROTECTION		
Study cycle: FIRST	Study year: FOURTH	Semester: VIII/SUMMER	Number of ECTS credits: 6
Status: Elective		Total number of hours: 60 Lectures 30 Practical courses 30	
Participants in class:	Lecturers and assistants selected for the field to which the course belongs		
Prerequisite for enrollment:	-		
Course objectives:	The goal of the course is for students to learn and understand the specificity of karst and the importance of preserving its naturalness, and to become familiar with ways of monitoring the condition of the karst environment and measures for karst protection.		
Course topics:	1. Karst – concept and conditions for the development of karst. Karst processes. Natural and social specificities and characteristics of karst. Ecological and sociological importance of karst. Karst in the world. Dinaric karst. Karst in Bosnia and Herzegovina. 2. Karst research during the past within the framework of geosciences. Karstology. Approaches, research methods and current topics in the world in karst research. A holistic approach to karst research and management. 3. Geological and geomorphological characteristics of karst. Karst classification. 4. Hydrological, hydrogeographic and hydrogeological specificities and characteristics of karst. Precipitation regime and air temperature. Karst streams, lakes and swamps in karst. Karst aquifers and water sources. 5. Genesis and evolution of soil in karst. Pedosystematic soil units in karst. Way of using land in karst. 6. General characteristics and specificities of flora and fauna in the karst. 7. General characteristics and specificities of settlements and economic activities in karst. 8. Test. 9. Management of karst basins and protection of surface and underground waters in karst. Water sampling and analysis methods. Assessment of the ecological status of karst fluids.		



	10. Protection of karst aquifers and springs against pollution. Methodology for assessing risks and dangers of pollution of karst aquifers and water sources. 11. Travertine. Conditions for casting. Methods of measuring tufa growth and its destruction. Ecological and aesthetic value of tufa. Protection of travertine-forming rivers. 12. Management and protection of caves and pits. The speleothem and its touristic and educational value. Sediments in the karst underground and their scientific significance. 13. Degradation of soils into karst and their protection measures. 14. Protection of habitat, flora and fauna in karst. Deforestation and reforestation in karst. Preservation of wetland habitats. Protection of speleofauna. Protected areas in karst. 15. Municipal waste management in karst. Contents of the GIS database for integral management and protection of karst.
Learning outcomes:	Knowledge: • the student can explain the development of the karst relief and features of the karst hydrography, • the student understands the specifics of karst, • the student can explain the methodology of assessing the state of the karst environment. Skills: • the student creates a GIS database for the management of the karst environment independently and in a team, Competencies: • the student independently and in a team selects adequate methods of assessment of the existing condition and adopts measures for sustainable karst management. • the student is trained to work in various companies for environmental protection.
Teaching methods:	Lectures and practical work are held in the office and, if necessary, on the field. Lectures are auditory with multimedia content, and exercises are realized through practical, independent work on a given topic.



Knowledge testing methods with a grade structure¹:	Knowledge test – criterion: Attending lectures and exercises: max 5 – condition 3 points Activity during class: max 5 – condition 3 points Seminar (written article): max. 10 – condition 5 points Partial test during the semester: max 40 – condition 22 points Final exam at the end of the semester: max 40 – condition 22 points Total 100 points, condition for passing 55 points Gradeing: <table><tr><th>Evaluation</th><th>ECTS evaluation</th><th>Number of points</th></tr><tr><td>10</td><td>(A) excellent</td><td>95 - 100</td></tr><tr><td>9</td><td>(B) very good</td><td>85 - 94</td></tr><tr><td>8</td><td>(C) good</td><td>75 - 84</td></tr><tr><td>7</td><td>(D) satisfactory</td><td>65 - 74</td></tr><tr><td>6</td><td>(E) sufficient</td><td>55 - 64</td></tr><tr><td>5</td><td>(F, FX) fail</td><td>< 55</td></tr></table>	Evaluation	ECTS evaluation	Number of points	10	(A) excellent	95 - 100	9	(B) very good	85 - 94	8	(C) good	75 - 84	7	(D) satisfactory	65 - 74	6	(E) sufficient	55 - 64	5	(F, FX) fail	< 55
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5	(F, FX) fail	< 55																				
Literature²:	Mandatory: • Ford, D., Williams, P. (2007): Karst Hydrogeology and Geomorphology, John Wiley & Sons, Ltd, Chichester. (selected chapters) • Lučić, I. (2019): Presvlačenje krša: Povijest poznavanja Dinarskog krša na primjeru Popova polja, Synopsis, Zagreb – Sarajevo. (selected chapters) • Mihevc, A., Prelovšek, M., Zupan Hajna, N. (eds.) (2010): Introduction to the Dinaric Karst, Inštitut za raziskovanje krasa ZRC SAZU, Postojna. Recommended: • Rnjak, G. (ur.) (2017): Speleologija, Planinarsko društvo sveučilišta Velebit, Hrvatski planinarski savez, Hrvatska gorska služba spašavanja, Speleološko društvo Velebit, Zagreb. • Bonacci, O., Lučić, I., Marjanac, T., Perica, D., Vujčić – Karlo, S. (2008): Krš bez granica: popularno-znanstvena monografija, Zagreb – Sarajevo.																					

¹ The structure of points and point criteria for each subject is determined by the council of the organizational unit before the beginning of the academic year in which the subject is taught in accordance with Article 64, Paragraph 6 of the Law on Higher Education of the Canton of Sarajevo.

² The senate of the higher education institution as an institution, i.e. the council of the organizational unit of the higher education institution as a public institution, determines the mandatory and recommended textbooks and manuals, as well as other recommended literature on the basis of which the exam is prepared and taken, by a special decision that it must publish on its website before the beginning of the academic year in accordance with Article 56, Paragraph 3 of the Law on Higher Education of the Canton of Sarajevo.



- Pernar, N. (2017): Tlo – nastanak, značajke, gospodarenje, Udžbenici Sveučilišta u Zagrebu, Sveučilište u Zagrebu i Šumarski fakultet, Zagreb.
- Kranjc, A. (2003): Dinaric Karst. In J. Gunn (ed.) Encyclopedia of Caves and Karst Science. Fitzroy Dearborn, New York - London, 287–289.
- Bonacci, O. (2003): Ekohidrologija vodnih resursa i otvorenih vodotoka, Građevinsko-arhitektonski fakultet Sveučilišta u Splitu i Institut građevinarstva Hrvatske, Split – Zagreb.
- Iván, V., Mádl-Szőnyi, J. (2017): State of the art of karst vulnerability assessment: overview, evaluation and outlook, Environmental Earth Sciences, Springer Nature, vol. 76, article number: 112. DOI: 10.1007/s12665-017-6422-2
- Parise, M., Ravbar, N., Kaufmann, G., Gabrovsek, F. (2018): Advances in Karst Research: Theory, Fieldwork and Applications, Geological Society of London, London.
- Scientific journal Acta Carsologica, ZRC SAZU, Postojna.
- Professional bulletin Naš krš, Centar za krš i speleologiju, Sarajevo.