

Course and Workshop Lecturers

Lectures, laboratory and field demonstrations, and tutorials will be conducted by university professors and leading experts from the industry and research organizations from around the World. These include the University of Belgrade and the Geological Survey of the Republic of Srpska, Zvornik, B&H), the University of Texas at Austin (UT), UNESCO centres, HET – HydroElectro Trebinje. The participation in the programme has been confirmed by Dr. Neven Kresic (AMEC, USA), Dr. Petar Milanovic (ret. Univ. of Mostar), Dr. Ognjen Bonacci (Univ. of Split), and Dr. Neno Kukuric (UNESCO-IGRAC). They all started their distinguished international careers working in the Dinaric region. Professors from the UT are John M. Sharp, Marcus Gery and Suzanne Pierce. Other international experts from the Karst Commission of IAH and international university centers of excellence will be invited to take part in the course during the following years as well.

About the Course Partners

Organizers:

- Department of Hydrogeology and Centre for Karst Hydrogeology of the University of Belgrade - The Faculty of Mining & Geology (<http://www.karst.edu.rs>)
- The Geological Survey of the Republic of Srpska, Zvornik (Bosnia & Herzegovina) (<http://www.geozavodrs.com>)

in cooperation with:

- Department of Geological Sciences, The University of Texas at Austin, USA (<http://www.geotexas.edu>)
- HET (Hydro-Electro System on Trebisnjica River), Trebinje, Bosnia & Herzegovina (<http://www.het.ba>)
- Karst Commission of the IAH (International Association of Hydrogeologists) (<http://www.iah.org/karst>)
- The Geological Survey of Montenegro, Podgorica, Montenegro (www.geozavod.co.me)
- The Jaroslav Černi Institute for the Development of Water Resources (JCI) and its UNESCO's Category 2 Centre, Serbia (<http://www.jcerni.org>)
- IGRAC (International Groundwater Resources Assessment Centre), Delft, The Netherlands (<http://www.un-igrac.org>)
- Edwards Aquifer Authority, San Antonio, Texas, USA (www.edwardsaquifer.org)
- Speleological club "Zelena brda" (Green Fields), Trebinje, Bosnia & Herzegovina (<http://www.24casa.com/zelenabrda/contact.php>)

Course Fee

The attendants are responsible for covering travel and accommodation cost which is very affordable in comparison with nearby tourist centers (accommodation and food costs in Trebinje are on the order of 40-50 USD/day). Although the course is not commercially based for university students, the participants will be charged to cover operating cost (field trips, refreshments, tutorials preparation and copying, and similar). Working professionals will be charged a modest fee in addition.



Additional information:

Prof. Dr Zoran Stevanovic , accredited full professor responsible for the course implementation and Head of the Centre for Karst Hydrogeology

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Preliminary Announcement



Department of Hydrogeology and
Centre for Karst Hydrogeology
of the University of Belgrade - The
Faculty of Mining & Geology
&
The Geological Survey of the
Republic of Srpska, Zvornik



present course and field seminar

Characterization and Engineering of Karst Aquifers



Why this Course?

Groundwater in karst environments has intrigued scientists, engineers, and ordinary people alike for millennia due to its many fascinating facets. It feeds the world's largest springs, many of which enabled the establishment of the first urban centers in human history and continue to serve as reliable sources of water supply to the present day; it creates mysterious underground world of caves; it supports living creatures often unique to specific locations; it behaves unpredictably as it can sometimes rise hundreds of feet after heavy rains in the matter of hours giving life to numerous temporary springs, increasing the flow of permanent springs 1000-fold, and often causing serious floods; and it is extremely vulnerable to both natural and anthropogenic contamination thus seriously limiting its unrestricted use in many parts of the world. The aim of this course is to prepare both the academic students and the working professionals for the challenges of working on karst water resources.

About Dinaric Karst

Term Dinaric Karst is a synonym for fully developed, classic, mature karst. The term karst itself was born in the Dinaric region and, along with many other local terms (doline, polje, uvala, ponor) is now widely used internationally. The region is also the birthplace of karstology - a scientific discipline whose foundations were laid by Jovan Cvijić and his peers at the end of the 19th century.



The Dinaric system (Dinarides) is a long, NW-SE oriented orogenic belt, parallel to the Adriatic Sea, with numerous intermountain depressions, large karst poljes, and valleys created by perennial and sinking streams. Its

NW fringe is the Carso area around Trieste in Italy while the SW part continues deep into Albania. In between, it extends over the territories of six countries of former Yugoslavia: Slovenia, Croatia, Bosnia and Herzegovina, Montenegro, Serbia, and FYR of Macedonia.

Due to its historical importance for the development of karst science, and exemplary karst landforms including numerous geo-heritage sites, abundant groundwater resources, and engineering structures for their use, an initiative has recently been taken to include the entire Dinaric region in the UNESCO's list of World heritage sites.

Course Location

Trebinje is the largest town of eastern Herzegovina, located on the northern rim of one of the spectacular karst poljes of the Dinarides – Popovo polje in the Trebisnjica river basin, just 30km from the Adriatic coastline. Home of the historic Karst Institute, since 1960s Trebinje also serves as the headquarters of one of the World's largest water resources engineering projects in karst. With karst poljes, dams, artificial reservoirs, water supply intakes and tunnels, caves, specific karst features, underground endemic species, countless project documentation, and experience and knowledge of local experts, Trebinje is an ideal place to learn about karst and its specific character. This is also the main reason why Trebinje was selected as the headquarters of a large GEF/UNDP/UNESCO project named DIKTAS (Dinaric Karst Transboundary Aquifer System). The Adriatic Sea, and historic towns from the UNESCO world heritage list – Dubrovnik, Mostar, and Kotor, as well as their famous karst springs, will also be visited during the course field trips.



Course Organizer

The University of Belgrade, a state-owned institution with a long tradition, is home to 72,000 students enrolled in 31 colleges and schools. It offers academic and professional studies based on accredited higher education programmes which are fully adapted to common European high-education standards. Diplomas granted by the University of Belgrade are recognized worldwide. The Department of Hydrogeology at the Faculty of Mining & Geology is one of the four accredited geology programmes. The courses are offered at three levels: undergraduate academic studies, a four-year program; masters studies as a one-year program; and doctorate studies, a three-year program (www.rgf.bg.ac.rs/dhg).



Since the Department's beginning in 1971, a total of 721 students earned the title Engineer of Geology for Hydrogeology equivalent to the MS degree. During the same period, the Department granted 40 doctorates (PhD degrees) to candidates from different disciplines of hydrogeology and related sciences. Today, 40% of all students enrolled in the geology programs at the University start as students of Hydrogeology.

The Department has broad international cooperation with many universities, professional and research institutions. The members of the Department have been working on a variety of national and international research and engineering projects and serve as experts and consultants to the UN and other international and national organizations. The Department regularly organizes national and international scientific events and workshops.

The Department of Hydrogeology has two laboratories and seven centers including Centre for Karst Hydrogeology.

About the Course and Karst Workshop

The academic course "Characterization and Engineering of Karst Aquifers" is developed primarily for graduate students and students in senior years of undergraduate studies in geology, environmental sciences, and engineering that are interested in the research of karst environments and in the development and engineering of karst water resources. The professionals and decision makers involved in engineering and management of karst waters or environments will also benefit from the course by improving their understanding of karst processes and sensitivity.



The course consists of intensive 6-day lectures and laboratory, followed by the field work, 2 one-day field trips, and the final exam. The goal of the course is to enhance knowledge of basic hydrogeology in fractured rock and karst aquifers, introduce applicable investigation

methods, and provide framework for monitoring, engineering and management of water in karst. Design and execution of field investigations, design and optimization of groundwater extraction, aquifer protection and restoration, artificial groundwater control, and prevention of leakage from reservoirs constructed in karst are some of the specific topics that attendants will study and perform field work on.

The course is certified by the University of Belgrade as one of the regular courses of the MS Program of the Department of Hydrogeology. Its value is 6 ECTS (European Credit Transfer and Accumulation System). The already established communication with several high-education centers in the United States will result in the final contents of the course including academic credit value per U.S. standards. All attendants who pass the final exam will receive certificate of attendance, credits and the final grade. Concurrently with the academic course, a three-day karst water resources workshop for working professionals will be conducted for those that cannot attend the full course.

The full academic course will take place in early summer months (June) and will last approximately 10 days including lectures, field work, field trips and exams. The starting year is 2014, the same year in which the International Symposia on Transboundary Karst Groundwater under auspices of DIKTAS and UNESCO is scheduled to take place in Trebinje.