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|--|---|-------------|--------------------------|------------------------------|------------------------------|-----------------|------------|
| <b>Title</b>   | <b>Water Chemistry</b>  |             |                          |                              |                              |                 |            |
| <b>Code</b>  | ZDIK27  |             |                          |                              |                              |                 |            |
| <b>Study Program</b>   | Postgraduate Interdisciplinary University Programme Environment protection and Nature Conservation  |             |                          |                              |                              |                 |            |
| <b>Semester</b>  | III.  |             |                          |                              |                              |                 |            |
| <b>ECTS</b>  | 5   |             |                          |                              |                              |                 |            |
| <b>Status</b>  | elective  |             |                          |                              |                              |                 |            |
| <b>Lecturer</b>  | Assistant Proffesor Mirna Habuda-Stanić, PhD  |             |                          |                              |                              |                 |            |
| <b>Co-Lecturers</b>  | -   |             |                          |                              |                              |                 |            |
| <b>Requirements for Enrolment</b>  | Enrolled doctoral studies   |             |                          |                              |                              |                 |            |
| <b>Objectives</b>  | Introduction to the chemical composition of water, acidity and alkalinity of waters. Occurrence of carbonate and bicarbonate in waters and buffer capacity of waters. Introduction to the processes of deposition and dissolution in aquatic environment depending on the water chemistry and the proportion of oxide, hydroxide and mineral components present in the water. Introduction to the redox conditions of individual water bodies and its impact on the chemical composition of natural waters with the review to regulation possibilities of the chemical composition of water. Introduction to occurrence of metals and heavy metals in water bodies as well as to treatment methods for their regulation. Introductions to water quality parameters and determination of water body quality. Introduction to various pollutions of the water environment. Introduction to measures for water protection. |             |                          |                              |                              |                 |            |
| <b>Learning Outcomes</b>   | <ol style="list-style-type: none"> <li>1. acquiring knowledge of the water chemistry and its impact on water bodies and entire environment</li> <li>2. acquisition competences for determining the water chemistry</li> <li>3. acquiring competences for assessment quality of the water environment</li> <li>4. acquiring competences for water body management (selection of protective or remediate measures)</li> </ol>   |             |                          |                              |                              |                 |            |
| <b>Connection between Learning Outcomes, Curricular and Student Activities</b> | <b>Student Activities</b>   | <b>ECTS</b> | <b>Learning Outcomes</b> | <b>Curricular Activities</b> | <b>Methods of Assessment</b> | <b>Credits*</b> |            |
|  |   |             |                          |                              |                              | <b>min</b>      | <b>max</b> |
|  | Lectures  | 1           | 1-4                      | attending lectures           | records of the presence      | 0               | 1          |
|  | Seminar   | 1           | 1-4                      | seminar writing              | seminar work                 | 0               | 1          |
|  | Knowledge Testing   | 1,5         | 1-4                      | writing exam                 | written examination          | 0               | 1,5        |
|  | Knowledge Testing   | 1,5         | 1-4                      | oral exam                    | oral examination             | 0               | 1,5        |
| <b>Total</b>   | <b>5</b>  |             |                          |                              |                              | <b>0</b>        | <b>5</b>   |
| <b>Consultations</b>   |   |             |                          |                              |                              |                 |            |
| <b>Learning Activities</b>   | <b>Lectures</b>   |             | <b>Seminars</b>          |                              | <b>Practice</b>              |                 |            |
| <b>Hours</b>   | 10  |             | 5                        |                              | 0                            |                 |            |
| <b>Contents / Teaching Units</b>   | Chemical composition of natural waters. Acidity and alkalinity of waters. Occurrence of carbonate and bicarbonate in waters and buffer capacity of waters. Processes of deposition and dissolution in aquatic environment. Buffering capacity of aquatic systems. Mineral components present in the water. Metals and heavy metals in the water. The influence of the chemical composition of the water resources on the environment. Redox conditions of aquatic systems. Water quality parameters - indicators of the water quality. Methods for monitoring of water environment. Protection or remediation of the water environment.   |             |                          |                              |                              |                 |            |

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| <b>Obligatory Literature</b>               | <ol style="list-style-type: none"> <li>1. Kemmer, F.N. 2005. Nalkov priručnik za vodu, Drugo izdanje, Građevinska knjiga, Beograd</li> <li>2. Sincero A.P.; Sincero G.A. Physical-chemical treatment of water and wastewater, IWA-CRC Press, Washington D.C. 2003.</li> <li>3. American Water Works Association. Water Quality and Treatment, McGraw-Hill, Inc., New York, 1999.</li> <li>4. Tedeschi, S.: Zaštita voda. HDGI, Zagreb, 1997</li> </ol> |
| <b>Recommended literature</b>              | Scientific papers published in international journals (original research papers, review articles)  |
| <b>Requirements for Aquiring Signature</b> | Class attendance, completed and evaluated seminar work   |
| <b>Type of Exam</b>                        | Written and Oral exam  |
| <b>Lectures Language</b>                   | Croatian and English   |
| <b>Quality Monitoring</b>                  | Standard quality assurance procedures due to the guidelines of Quality Board of Josip Juraj Strossmayer University of Osijek (evaluation of the work during the semester, evaluation of the work after the end of classes etc.)  |