

Course Unit Descriptor

Study Programme: Bachelor Academic Studies in Chemistry - Quality Control and Environmental Management, Bachelor Academic Studies in Environmental Protection – Environmental Protection Analyst			
Course Unit Title: Remediation Processes and Technologies			
Course Unit Code: OZZS-605			
Name of Lecturer(s): Associate Professor Snežana Maletić, Full Professor Srđan Rončević			
Type and Level of Studies: Bachelor of Science Degree			
Course Status (compulsory/elective): Compulsory for Bachelor Academic Studies in Chemistry - Quality Control and Environmental Management Elective for Bachelor Academic Studies in Environmental Protection – Environmental Protection Analyst			
Semester (winter/summer): Summer			
Language of instruction: English			
Mode of course unit delivery (face-to-face/distance learning): Face-to-face			
Number of ECTS Allocated: 6			
Prerequisites: None			
Course Aims: Introduce students to the basic remediation processes and technologies and prepare students for the remediation of the contaminated sites.			
Learning Outcomes: Students should know how to: define and describe the most frequently applied remediation techniques; analyze and consider contaminated sites and on determine the need for remediation; choose a technique or technology needed for the rehabilitation of a locality, management of physical, chemical and biological processes in the direction of protection against further contamination and remediation of existing conditions; solve computational tasks related to remediation treatments.			
Syllabus: <i>Theory</i> Introduction to the techniques and technologies for the remediation of the contaminated sites and the processes on which they are based. Contaminated sites - the type and distribution of contamination and remediation. Bioremediation (principles, factors, and techniques of in-situ and ex-situ process monitoring). Phytoremediation. Physico-chemical remediation techniques (solidification / stabilization, separation, electrokinetics, incineration and pyrolysis, oxidation). Remediation of oil contaminated surface waters. Remediation of contaminated sediment. Sustainable management of sediment. Kinetics of the remediation process. <i>Practice</i> Calculations.			
Required Reading: 1. M. Alexander: Biodegradation and Bioremediation (second edition), Academic Press, San Diego-London-Boston-New York-Sydney-Tokyo-Toronto, 1999. 2. CISB, WSTB, CETS, NRC: In situ bioremediation: When Does It Work?, National Academy Press, Washington, D.C., USA, 1993. 3. CIRT, WSTB, BRWM, CGER, NRC: Innovations in ground water and soil cleanup: From concept to commercialization. National Academy Press, Washington, DC, 1997. 4. G. Schwedt: The Essential Guide to Environmental Chemistry, Part 4 Soil, John Wiley and Sons, LTD, Chichester-New York-Weinheim-Brisbane-Singapore-Toronto (prevod), 2001.			
Weekly Contact Hours: 5	Lectures: 3	Practical work: 2	
Teaching Methods: Lectures, calculations, consultations.			
Knowledge Assessment (maximum of 100 points): 100			
Pre-exam obligations	points	Final exam	points
Active class participation	5	Written exam	30

Practical work	5		
Preliminary exam(s)	30	Oral exam	20
Calculation exam	10		