

<b>Study Programme:</b> Master Academic Studies in Environmental Protection - Environmental Protection Analyst			
<b>Course Unit Title:</b> Contaminated Sites Sanitation			
<b>Course Unit Code:</b> IZZS-608			
<b>Name of Lecturer(s):</b> Full Professor Srđan Rončević, Associate Professor Snežana Maletić			
<b>Type and Level of Studies:</b> Master of Science Degree			
<b>Course Status (compulsory/elective):</b> Elective			
<b>Semester (winter/summer):</b> Summer			
<b>Language of instruction:</b> English			
<b>Mode of course unit delivery (face-to-face/distance learning):</b> Face-to-face			
<b>Number of ECTS Allocated:</b> 5			
<b>Prerequisites:</b> None			
<b>Course Aims:</b> Upgrading and synthesizing students' knowledge in the field of soil and groundwater protection with the aim of training for characterization, sanitation, and remediation of contaminated sites.			
<b>Learning Outcomes:</b> Students should know how to: identify and perform characterization of contaminated sites; on the basis of obtained data conceptualize or define the technical task for sanitization and remediation projects; monitor implementation of sanitization and remediation projects, and based on the risk assessment, estimate when it is completed.			
<b>Syllabus:</b> <i>Theory</i> Characterization of contaminated sites. Overview of national and EU legislation in the field of land and groundwater management. Sources and types of pollutants in soil and groundwater as a result of activities and technological processes and ELVs. Environmental quality standards. General principles of monitoring. Defining a soil sampling pattern (sampling site, grid density, sampling depth) and methods of soil sampling. Defining a pattern for groundwater sampling (sampling points, density, sampling depth) and groundwater sampling. Defining parameters for soil and groundwater analysis. Monitoring programme (occasional - dynamic template, and permanent-automatic). Analysis of soil and groundwater monitoring data. Migration of pollution through different geological environments (LNAPL and DNAPL). Methods for detection of pollution of soil and groundwater. Analysis of the risk of the spread of soil and groundwater contamination. Hydrogeological modeling of pollution migration through different geological environments. Preventive measures for soil and groundwater contamination and reacting in case of accidental pollution. Assessment of the quantity (area and volume) of polluted land and groundwater and remediation. Contaminated sites sanitation projects (design, content, verification). Choice of adequate remediation methods and their combinations with examples in industry. Monitoring the remediation and sanitation project, estimation of the end point of the remediation project based on risk assessment. Assessment of the soil and groundwater remediation costs with industrial examples. <i>Practice</i> Contaminated sites sanitation and remediation projects preparation.			
<b>Required Reading:</b> 1. Martin N. Sara: Site Assessment and Remediation Handbook, Second Edition, Lewis Publisher, 2003.			
<b>Weekly Contact Hours:</b> 4	<b>Lectures:</b> 2	<b>Practical work:</b> 2	
<b>Teaching Methods:</b> Lectures, desk study projects			
<b>Knowledge Assessment (maximum of 100 points):</b> 100			
<b>Pre-exam obligations</b>	points	<b>Final exam</b>	points
Active class participation	10	Written exam	/
Preliminary exam(s)	50	Oral exam	40