

**Table 5.2** Course specification

Type and level of studies: Bachelor Academic Studies, 1 <sup>st</sup> level			
<b>Course name: Remediation Processes and Technologies</b>			
Course status: Compulsory for Bachelor Academic Studies in Chemistry - Quality Control and Environmental Management; Elective for Bachelor Academic Studies in Environmental Protection – Environmental Protection Analyst			
Number of ECTS credits: 6			
Requirement: None			
<b>Course aim</b>			
Introduce students to the basic remediation processes and technologies and prepare students for the remediation of the contaminated sites.			
<b>Course outcome</b>			
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.			
<b>Course content</b>			
<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: Practical classes, OFT, SRW</i>			
Calculation - process kinetics, engineering, sediment and soil remediation treatments.			
<b>Literature</b>			
1. Teaching material, PMF Novi Sad, PMF moodle			
2. S.Rončević: Internal Script - Remediation Technologies, PMF, Novi Sad, 2010.			
3. B. Dalmacija, O. Petrović, S. Rončević, I. Ivančev-Tubas, M. Bečelić, J. Simeunović, J. Agbaba, D. Radnović, N. Lazić, M. Đukić: Naftno zagađenje područja Ratni otok - moćnosti prirodnih bioremedijacija, Prirodno-matematički fakultet, Novi Sad, 2004			
4. Rončević S., Karlović E., Maletić S., Watson M.A. : Remedijalistički procesi, Zagruženje majke u vodećem ekosistemu i remekcionalizaciji (Ured.Dalmacija B. i Agbaba J.), PMF-član za hemiju, Novi Sad, 2008.			
5. I. Dorčić: Osnivanje čijih ubistavnih zagovora. SKTH / Kemija u industriji, Zagreb, 1987.			
6. M. Alexander: Biodegradation and Bioremediation (second edition), Academic Press, San Diego-London-Boston-New York-Sydney-Tokyo-Toronto, 1999.			
7. CISB, WSTB, CETS, NRC: In situ bioremediation: When Does It Work?, National Academy Press, Washington, D.C., USA, 1993.			
8. CIRT, WSTB, BRWM, CGER, NRC: Innovations in ground water and soil cleanup: From concept to commercialization. National Academy Press, Washington, DC, 1997.			
9. 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.			
<b>Number of classes of active teaching</b>			Other classes
Lectures: 3(45)	Practice: 2(30)	OFT: SRW:	
<b>Teaching methods</b> Lectures, practice, seminars, consultation			
<b>Assessment of knowledge (maximum of 100 points)</b>			
<b>Pre-exam obligations</b>	<b>Points</b>	<b>Final exam</b>	<b>points</b>
activity during lecture classes	5	written exam	30
practical teaching	5	oral exam	20
colloquia	30	/	/
Calculation colloquia	10	/	/