

Title	Biotechnology in environmental protection						
Code	ZDIK32						
Study Program	Postgraduate Interdisciplinary University Programme Environment protection and Nature Conservation						
Semester	III.						
ECTS	5						
Status	elective						
Lecturer	Assistant Professor Nikolina Udiković Kolić, PhD						
Co-Lecturers	-						
Requirements for Enrolment	Enrolled doctoral studies						
Objectives	Introduce students to the basic microbiology and engineering principles, and point to the use of microorganisms in biotechnological processes of waste treatment and thus solving problems of the growing environmental pollution (from the traditional application of activated sludge to the application of the contemporary methods of detoxification of hazardous substances).						
Learning Outcomes	Students will gain knowledge about biocatalytic activity of microorganisms and their role in biogeochemical cycling. This will enable them to better understand the role of microorganisms in remediation of contaminated environment and understanding of measures to mitigate the effects of the presence of harmful/dangerous substances in the environment and preventing further environmental pollution.						
Connection between Learning Outcomes, Curricular and Student Activities	Student Activities	ECTS	Learning Outcomes	Curricular Activities	Methods of Assessment	Credits*	
						min	max
	Oral exam	50%	1-5	Testing understanding of the subject area	Oral exam		
	Seminar paper	50%	1-6	Review and understanding of the given literature and writing of the seminar paper	Grading seminar paper		
	Total	100%					
Consultations							
Learning Activities	Lectures		Seminars		Practice		
Hours	15						
Contents / Teaching Units	The basic principles of the application of biotechnology for environmental protection. The metabolic pathways of transformation of the most important pollutants. The processes in the activated sludge. Aerobic processes in biofilm. Nitrification and denitrification. Removing phosphorus. Anaerobic digestion (methanogenesis). Biological treatment and detoxification of hazardous waste. Bioremediation. Biotechnology in the treatment of municipal and industrial waste. New bioprocesses and bioreactors.						
Obligatory Literature	1. Rittmann, B. E. and McCarty, P. L.: Environmental Biotechnology – Principles and Applications, McGraw-Hill Higher Education, 2001. 2. Evans, G.M. and Furlong J.C.: Environmental Biotechnology – Theory and Application, J Wiley and Sons Ltd. 2003.						
Recommended literature	1. Alexander, M.: Biodegradation and Bioremediation, 2nd ed. Academic Press, Inc. 1999. 2. Cheremisinoff, N. P. (ed.): Biotechnology for Waste and Wastewater Treatment,						

	Noyes Publications, 1996.
Requirements for Aquiring Signature	Attending lectures or consultations, Seminar paper
Type of Exam	Oral exam. A seminar paper is required for this course.
Lectures Language	Croatian, english
Quality Monitoring	