

Study Programme : BSc in Ecology			
Degree level: Bachelor degree			
Course Title: BIODEGRADATIONS			
Professor: Dr. Milan Matavulj			
Elective Course			
Number of ECTS: 5			
Prerequisites: Credit points (Chemistry, Biochemistry, Microbiology, and Microbial Ecology)			
Course Objective: A course designed to acquaint students with biology, role and significance of microorganisms in environmental degradative processes and in biotechnological use, as well as in environmental protection. Emphasis will be placed on microbial enzymes research, their metabolism as the basis of matter cycle and energy flow through the ecosystem.			
Course Outcome: Enabling students to understand the role of microorganisms in processes of matter cycle in nature, and their significance in biotechnological processes and in environmental protection. Also enabling them for independent and individual research work: experiment design, results recording, analysis, interpretation of results, elaboration and presentation, eventually use of new experience in conducting simple experiments related to the specific interrelationship of microorganisms with other organisms; to explain the role of microorganisms in biotechnological processes and in natural environments.			
Course Content:			
<i>Theoretical part:</i> Students get acquainted with general characteristics of microorganisms, especially as producers of extracellular (and intracellular) degradative enzymes, with their significance in biodegradation of natural and anthropogenic waste materials. Understanding microbial processes of biodegradation of easy-to-degrade as well as resistant, difficult to degrade organic substances, biosynthetic and chemosynthetic: xenobiotics (pesticides, polycyclic aromatic, and halogenated compounds). Emphasis will be placed on research of microbial metabolic processes as the basis for self-purification of natural surface freshwaters as the main recipients of anthropogenic pollution, as well as in biotechnological processes in wastewater purification plants. Biodegradation as the basis for bioremediation processes and methods.			
<i>Practical part:</i> Developing competence in cultivation of microorganisms. Principles of experimental work: the best sampling practice, inoculation on solid media and cultivation procedure. Developing skills in results recording procedure. Getting knowledge in methods of purification of bacterial isolates. Conservation for culture collection and learning rules and procedures for culture maintenance. Through the practicals, students get acquainted with physiological characteristics of isolated cultures of microorganisms. Cultivation with the aim of optimization of microbial growth in different experimental conditions in order to understand microbial (eco)physiology (enzyme activity: hydrolase, esterase, protease, lipase, saccharase, cellulase, etc. Microbial degradation of phenolic compounds, naphtha and oil derivatives, polycyclic aromatic hydrocarbons, pesticides, what is in the basis of biodegradative processes used in environmental protection technology.			
Reading List:			
1. Pejin D (2003): Industrial microbiology. University of Novi Sad, Faculty of Technology, Novi Sad (In Serbian).			
2. Radnović D, Matavulj M, Karaman M (2007): Mycology, Ed. By. Department of Biology and ecology, Faculty of Sciences, University of Novi Sad and WUS Austria (In Serbian).			
3. Alexander M (1994): Biodegradation and bioremediation. Academic press.			
4. Betts, WB (editor): Biodegradation: natural and synthetic materials. Springer series in applied biology.			
5. Chaudhry GR (editor) (1994): Biological Degradation and Bioremediation of Toxic Chemicals. Chapman & Hall, London.			
6. Eriksson K-EL, Blanchette RA, Ander P (1990): Microbial and Enzymatic Degradation of Wood and Wood Components. Springer-Verlag.			
7. Topalova Y, Dimkov R (2003): Biodegradation of xenobiotics. Sofia University.			
8. Matavulj M (2011): Lecture outlines and power-point presentations (In Serbian)			
9. Madigan MT, Martinko JM (2006): Brock Biology of Microorganisms. Prentice Hall, Pearson Education Internat. (In English)			
Total hours:			
Lectures: 2	Practicals: 2	Other:	Student research work:
Methods of instruction: lectures, practicals, consultations, seminars, colloquia, visiting water purification plant			
Assessment (maximum number of points 100)			
Requirements	points	Final exam	points
Active participation in lectures	5	Practical exam	15
Colloquia (Pre-exam tests)	40	Oral exam	40
Remark: - Students will develop a deeper understanding of experimental work in microbiological laboratory through independent study. Part of the learning material will be available on the internet.			