

Study Programme : PhD in Biology			
Degree level: Doctoral degree			
Course Title: Microbial Physiology			
Professor: Dr. Milan Matavulj			
Elective Course			
Number of ECTS: 15			
Prerequisites: Credit points of Chemistry; Cell Biology, Microbiology, and of Biology of algae and fungi.			
Course Objective: A course designed to acquaint students with the principles and procedures of experimental research in the field of microbial physiology. Emphasis will be placed on systematization of basic knowledge on catabolic and anabolic aspects of metabolism, on microbial primary and secondary metabolism, and bioactive metabolites, connecting this experience with the possibilities of use of microorganisms in biotechnology as a resource of enzymes and other bioactive compounds.			
Course Outcome: Enabling students for independent and individual experimental work in the field of microbial physiology: microbial primary and secondary metabolism: experiment design, results obtaining and recording, analysis and interpretation of results, and elaboration and presentation, eventually use of new experience.			
Course Content:			
<i>Theoretical part:</i> Through the lectures, in this course students get acquainted with the contemporary concept of functional structure of procaryotic and eucaryotic microorganisms as the basis for different types of mechanisms of nutrients uptake. Energetic metabolism (aerobic and anaerobic respiration, fermentation, bacterial photosynthesis), and energetic groups of microorganisms. Microbial biosynthesis; Enzymes and regulation of metabolism; Physiology of microbial growth, development, and reproduction; Microbial ecophysiology: metabolism of carbon and nitrogen; Microbial role in environmental cycle of phosphorus, sulphur, iron, and other elements; Nitrogen fixation; The impact of ecological factors on microbial metabolism; Primary and secondary metabolism as the basis for biotechnological processes of the production of biosynthetic bioactive compounds; Physiological groups of microorganisms and physiological indicators of the rate of microbial (bio)transformations in natural ecosystems. Physiology of pathogenesis and immunology.			
<i>Practical part:</i> Emphasis will be placed on the methodology of examination of microbial physiology, what should enable students to understand contemporary tendencies of use of microorganisms in different biotechnology fields, as well as to understand the microbial role and problems related to biologically active substances in the environment, and functioning the biosystem and ecosystem as a whole. Through the active engagement, students will be involved in experimental research in the frame of research projects and transfer of knowledge.			
Reading List:			
1. Madigan MT and Martinko JM (2006): BROCK – Biology of Microorganisms . Pearson, Prentice Hall, 11th edition (In English).			
2. Radnović D, Matavulj M, Karaman M (2007): Mycology . Faculty of Sciences, University of Novi Sad. WUS Austria (In Serbian).			
3. Đukić D, Gajin S, Matavulj M, Mandić L (2000): Aquatic microbiology . Prosveta, Belgrade. (In Serbian).			
4. Rouz A H: Chemical microbiology . ICS Belgrad (In Serbian and in English).			
5. Turnet W B: Fungal metabolites . Academic press, London..., 1971 (In English).			
6. Group of authors (1998): Biologically active compounds of higher plants, fungi, algae and bacteria . Institute of Biology, Faculty of Sciences, University of Novi Sad, (In Serbian).			
7. Bekker ZE (1963): Physiology of fungi and their practical use . University of Moscow (In Russian).			
8. Petrović O, Gajin S, Matavulj M, Radnović D, Svirčev Z (1998): Microbiological examination of the surface freshwater quality . Institute of Biology, Faculty of Sciences, University of Novi Sad, (In Serbian).			
9. Martin Alexander: Biodegradation and bioremediation . Academic press, 1994 (In English).			
10. Eriksson K-EL, Blanchette RA, Ander P (1990): Microbial and Enzymatic Degradation of Wood and Wood Components . Springer-Verlag.			
Total hours:			
Lectures: 5	Practicals:	Other:	Student research work: 5
Methods of instruction: Lectures, practicals, consultations, seminars, colloquia participation in scientific meetings and seminars, visiting microbiological laboratories and active participation in research projects. Student choose two topics for seminar work which should be elaborated using internet or standard literature sources.			
Assessment (maximum number of points 100)			
Requirements:			
Remark: During the semestar students' seminar works will be evaluated, and remarks will be incorporated into summary remark making 60% of points. Another 30% they will gather through the oral exam, and 10% through the evaluation of their experimental research work.			