

<b>Study Programme : MSc in Biology</b>			
Degree level: Master degree			
<b>Course Title: Biofilms</b>			
<b>Professor: Petar, Knezevic</b>			
<b>Required/Elective Course: elective</b>			
<b>Number of ECTS: 7</b>			
<b>Prerequisites:</b>			
<b>Course Objective:</b>			
The aim is to familiarize students with the natural, ubiquitous phenomenon of microbial biofilms. Students will learn main phase of complex biofilm community development, its structure and factors that have influence on its development. The aim is to provide knowledge about positive and negative effects of biofilms in the environment, food industry, medicine, pharmaceutical industry and water supplying.			
<b>Course Outcome:</b>			
Students will be able to describe origin, structure, significance and methods of biofilm control. It will enable them to properly access the practical problems: to apply useful and control harmful biofilms.			
<b>Course Content:</b>			
<i>Theoretical part</i>			
Biofilm definition, formation and occurrence in different environments. Phase in biofilm formation. The importance of surface structure, extracellular polymeric substances and other characteristics of bacterial cells in the initial adhesion. Surfaces subjected to fouling and biofilm formation. Intercellular communication, formation and maturation of biofilm microcolonies. The complexity of a mature biofilm structure and detachment from surface. Methods of studying biofilms (cultivation, molecular methods, microscopy, mathematical modeling). Control of biofilm formation and bacterial resistance to conventional antimicrobial agents in biofilms. Biofilms in natural environments, the health risk in medicine, food and water supply. Positive effects of biofilms - application in water treatment.			
<i>Practical part</i>			
Introduction to techniques of studying the characteristics of bacterial cells responsible for the formation of biofilm-motility, autoaggregation, cell surface hydrophobicity. Quantification of extracellular polymeric substances production. Scanning electron microscopy. Quantification of formed biofilm (microtitre plate method with crystal violet). The effect of antimicrobial agents on biofilm.			
<b>Reading List:</b>			
1. Costerton, J. W., Lappin-Scott, H. (1995): Microbial Biofilms. Cambridge University Press, UK			
2. Costerton, J. W. (2007): The Biofilm Primer. Springer-Verlag			
3. Далмација Б., Агбаба Ј., Петровић О.(едит.) (2007): Вода и биофилм. Универзитет у Новом Саду, ПМФ, Департман за хемију			
4. Карловић Е., Агбаба Ј., Петровић О., Угарчина С., Кнежевић П. (2006): Управљање квалитетом воде у дистрибуционим системима. У књ. „Контрола квалитета воде за пиће“, ед. Далмација Б., Агбаба Ј., Природно-математички факултет Департман за хемију, Нови Сад, стр.392-470.			
<b>Total hours:</b>			
Lectures: 2	Practicals:	Other:	Student research work: 5
<b>Methods of instruction:</b>			
Lectures with using PowerPoint presentations; Practice- individual student work and demonstration of certain methods used in biofilm study			
<b>Assessment (maximum number of points 100)</b>			
<b>Requirements</b>	<b>points</b>	<b>Final exam</b>	<b>points</b>
Active participation in lectures	5	Practical exam	20
Active participation in practicals	30	Oral exam	20
Test(s) or	15		
Pre-exam testing			
Seminar papers	10		
<b>Remark:</b>			