

<b>Study program:</b> Agricultural Sciences
<b>Type and level of study:</b> Doctoral academic studies
<b>Course Title:</b> Biotechnology in Agriculture
<b>Teacher(s):</b> Dr Pankovic M. Dejana, full professor and dr Dragan G. Perovic, associate professor
<b>Status:</b> Obligatory, II semester
<b>ECTS:</b> 11
<b>Prerequisite:</b> None
<b>The goal of the course:</b> The main objective of the course Biotechnology in Agriculture is acquiring knowledge on the application of modern biotechnological methods in agriculture. In addition to mastering basic knowledge of molecular biology, the goal is understanding current knowledge on the relationship between plants and their environment, and biotic and abiotic stresses, which are the most common cause of decrease in crop production. Students will learn about the biotechnological methods used in the creation of transgenic plants, as well as increasing the resistance of plants to disease by using non-GMO methods of biotechnology.
<b>The outcome of the subject:</b> Enabling students for the practical application of modern biotechnological methods in agriculture and adoption of multidisciplinary approach to solving the fundamental problems in agriculture.
<b>Syllabus:</b> <i>Theoretical part</i> - 1 Introduction to Biotechnology ( Definition and classification of biotechnology , plant biotechnology , basic concepts of genomes and genome manipulation ) ; 2 gene modification and gene manipulation ( analysis and nucleic acid amplification ; enzymes as tools , general concepts of PCR as a diagnostic method ) ; 3 Laboratory methods in analyzing the genome of plants 1 (Extraction of DNA using the DNeasyPlantMiniKit ( Qiagen ) . Determination of the concentration of the extracted DNA by spectrophotometry – Nano view spectrophotometer ) ; 4 Cultivation of genetically resistant plants against diseases ( diseases of plants , methods for controlling plant diseases , application of biotechnology to increase the resistance of plants to diseases ) ; 5 Case Study - Increasing resistance to downy mildew in sunflower (sunflower and sunflower downy disease genes for resistance to downy mildew, use of molecular markers in sunflower breeding for resistance to downy mildew, genetic map Pl6 loci ) 6 Laboratory methods in the analysis of the genome of the plants 2 ( PCR - identification of the genes for disease resistance ) ; 7 Laboratory methods in analyzing the genome of the plants 3 ( Digestion of the PCR product by restriction enzyme digestion and electrophoresis ) ; 8 Molecular Agriculture ( Metabolic Engineering ; Examples of metabolism manipulation, Biodegradable Plastics , Edible vaccines ; Bioreactors ) ; 9 Useful microorganisms in agriculture ( <i>Trichoderma</i> - Application for increasing the resistance of plants to biotic and abiotic stresses ) 10 Laboratory methods in the analysis of the genome of microorganisms from soil 1 ( Extraction of DNA from soil and in pure cultures , determination of the concentration of the extracted DNA by spectrophotometry – Nano view spectrophotometer ) ; 11 Laboratory methods in the analysis of the genome of microorganisms in soil 2 ( PCR identification of <i>Trichoderma</i> strains by examining the variability of ITS sequences ) ; 12 Biotechnology and Environmental Protection (Environmental and health issues related to environmental protection , ethical and legal aspects of biotechnology ) ; <i>Practical classes</i> -
<b>Literature:</b> 1. Agricultural Biotechnology (2014) ISAAA SEAsiaCenter, c/o IRRI, Los Baños, Laguna 4031, Philippines; 1-40 p, <a href="http://www.isaaa.org/resources/publications/agricultural_biotechnology/download/default.asp">http://www.isaaa.org/resources/publications/agricultural_biotechnology/download/default.asp</a> Čurčić Nataša, Panković Dejana (2011) Gajenje genetički otpornih biljaka prema bolestima u cilju zaštite životne sredine. Monograph, 101 p., ISSN / ISBN978-86-87785-34-2, COBISSSR-ID267537671, University Educons, Print Atelje Sremska Kamenica. Ana Simonovic (2011) Biotehnologija i genetičko inženjerstvo biljaka, 401 p., NNK Internacional, Beograd Pavicevic Dušanka Savic, Gordana Matic (2011) Molekularna biologija 1,364 p. NNK Internacional, Beograd.

<b>Number of lectures:</b>				Other Classes
Lectures: 10	Practices: 4	Other forms of teaching:	Student research work: 6	
<b>Teaching methods:</b>				
Score for grading (maximal 100 points)				
A way of assessment may be different (written exam, oral exam, project presentations, seminars, etc.)				