

NAME OF THE COURSE		Biotechnology				
Code	PMC206	Year of study	2nd			
Course teacher	Viljemka Bučević Popović, Assistant Professor	Credits (ECTS)	2.5			
Associate teachers	Matilda Šprung, Assistant Professor	Type of instruction (number of hours)	L	S	E	F
			30		15	
Status of the course	obligatory	Percentage of application of e-learning	10%			
COURSE DESCRIPTION						
Course objectives	Getting acquainted with methods and application of modern biotechnology					
Course enrolment requirements and entry competences required for the course	No requirements					
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	<p>After completing the course, the student will be able to:</p> <ol style="list-style-type: none"> 1. Compare biotechnology processes with other production processes. 2. Discuss the main areas of application of modern biotechnology in agronomy, food and pharma industry, medicine etc. 3. Assess the importance of biotechnology products in everyday life (in food, medicine, etc.). 4. Discuss the benefits and potential risks of using biotechnology. 					
Course content broken down in detail by weekly class schedule (syllabus)	<p>LECTURES:</p> <ol style="list-style-type: none"> 1. Definition of biotechnology. History of biotechnology. 2. The first biotechnological products - beer, wine, bread. 3. Genetic engineering in biotechnology. 4. Production and purification of human proteins in heterologous systems. 5. Biotechnological processes. Bioreactor (fermenter). Upstream and downstream processes. 6. Enzymes as biotechnological products and their use in food, textile and other industries. 7. Biotechnological procedures for the production of amino acids, vitamins and antibiotics. 8. Methods for production of GM plants. GM plants available on the market (resistance to herbicides, insects or viruses). 9. The second and third generation of GM plants. Risks associated with GM plants. 10. Conventional medications vs. biotechnological drugs. Monoclonal antibodies - preparation and application. 11. Gene therapy and problems associated with gene therapy. Stem cells and their use in medicine. 12. Methods for transgenic animal production. Application of transgenic animals in biomedical research, agronomy and pharma industry. 13. Animal cloning. Human cloning - reproductive and therapeutic. 14. Application of biotechnology for DNA analysis in medicine and forensics. 15. Biotechnology and bioterrorism. Ethics in biotechnology. <p>EXERCISES:</p> <ol style="list-style-type: none"> 1. Heterologous expression of protein in E. coli. Growth media preparation, bacteria culture preparation, induction of protein expression. Cell biomass harvest. (4 hours) 2. Bacterial cell lysis, preparation of cell protein extracts. Purification of protein by chromatography on an FPLC apparatus. (4 hours) 3. Analysis of protein product by electrophoresis (SDS-PAGE). (4 hours) 4. DNA analysis by RFLP analysis. (3 hours) 					
Format of instruction	<input checked="" type="checkbox"/> lectures <input type="checkbox"/> seminars and workshops <input checked="" type="checkbox"/> exercises		<input type="checkbox"/> independent assignments <input type="checkbox"/> multimedia <input type="checkbox"/> laboratory			

	<input type="checkbox"/> <i>on line</i> in entirety <input type="checkbox"/> partial e-learning <input type="checkbox"/> field work		<input type="checkbox"/> work with mentor <input type="checkbox"/> (other)			
Student responsibilities	Attending classes, written exam for practical, oral exam					
Screening student work (<i>name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course</i>)	Class attendance	1.0	Research		Practical training	
	Experimental work		Report		(Other)	
	Essay		Seminar essay		(Other)	
	Tests		Oral exam	1.0	(Other)	
	Written exam	0.5	Project		(Other)	
Grading and evaluating student work in class and at the final exam	Written exam for practical – 20% Oral exam – 80%					
Required literature (available in the library and via other media)	Title			Number of copies in the library	Availability via other media	
	Renneberg, Biotechnology for Beginners, Academic Press, 2008.			1		
	Lectures as pdf files				available	
Optional literature (at the time of submission of study programme proposal)	Thieman, Palladino, Introduction to Biotechnology, Pearson, 2014. Clark, Pazdernik, Biotechnology, Academic Press, 2012.					
Quality assurance methods that ensure the acquisition of exit competences	Consultations, partial examinations, student survey for subject and teacher evaluation, attendance records, quiz performance analysis, partial and final exams.					
Other (as the proposer wishes to add)						