<table>
<tr><td colspan="2">NAME OF THE COURSE</td><td colspan="5">Applied Biotechnology</td></tr>
<tr><td>Code</td><td>PMB715</td><td>Year of study</td><td colspan="4">2</td></tr>
<tr><td>Course teacher</td><td>Viljemka Bučević Popović, PhD, Assistant Professor</td><td>Credits (ECTS)</td><td colspan="4">3</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2">Matilda Šprung, PhD, Assistant Professor</td><td rowspan="2">Type of instruction (number of hours)</td><td>L</td><td>S</td><td>E</td><td>F</td></tr>
<tr><td>15</td><td>15</td><td></td><td></td></tr>
<tr><td>Status of the course</td><td>elective</td><td>Percentage of application of e-learning</td><td colspan="4">10%</td></tr>
<tr><td colspan="7">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="6">Getting acquainted with applications of modern biotechnology</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="6">No requirements</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="6">After completing the course, the student will be able to:
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.</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">LECTURES:
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.

SEMINARS:
Selected topis in applications of modern biotechnology will be discussed.</td></tr>
<tr><td></td><td colspan="3">☒ lectures</td><td colspan="3">☒ independent assignments</td></tr>
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Format of instruction	☒ seminars and workshops ☐ exercises ☐ *on line* in entirety ☐ partial e-learning ☐ field work	☐ multimedia ☐ laboratory ☐ work with mentor ☐ (other)
Student responsibilities	Attending classes, written exam for practical, oral exam	

Screening student work *(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)*						
	Class attendance	1.0	Research		Practical training	
	Experimental work		Report		(Other)	
	Essay		Seminar essay	1.0	(Other)	
	Tests		Oral exam	1.0	(Other)	
	Written exam		Project		(Other)	

Grading and evaluating student work in class and at the final exam	Oral exam-100%

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
	Selected scientific papers		

Optional literature (at the time of submission of study programme proposal)	Glick, Patten, Molecular Biotechnology, Principles and Applications of Recombinant DNA, ASM Press, 2017. 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)	