<table>
<tr><td colspan="2">NAME OF THE COURSE</td><td colspan="5">Stem Cell Biology and Tissue Engineering</td></tr>
<tr><td>Code</td><td>PMB712</td><td>Year of study</td><td colspan="4">2.</td></tr>
<tr><td>Course teacher</td><td>Ivana Bočina, PhD
professor
Nives Kević, PhD
Assistant professor</td><td>Credits (ECTS)</td><td colspan="4">3</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2"></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>15</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"></td></tr>
<tr><td colspan="6">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="5">Course objectives are to introduce students with basic principles of stem cell biology and regenerative medicine; to present the main mechanisms of tissue engineering including growth and maintenance of the stem cell culture; and to make a point to the significance of applying stem cell and tissue engineering in the therapeutical purposes.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="5">Students should have some basic knowledge in cell biology and histology.</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="5">Learning outcomes:
1. To know the features of the stem cells and their possibilities.
2. To understand the grow and differentiation of the stem cells.
3. To get familiar with importance of application of the stem cells in the therapeutical purposes.
4. To understand basic principles in tissue engineering.
5. To explain perspectives and ethic aspects of using stem cells and tissue engineering in biomedicine.</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="5">Lectures:
1. Introduction to the stem cell biology. Features of the stem cells (2 hours).
2. Embryonic stem cells. Pluripotent stem cells and multipotent stem cells (2 hours).
3. Growth and maintenance of the stem cell culture (2 hours).
4. Hematopoietic stem cells, mesenchymal stem cells, methods of derivation, culturing and applications (2 hours).
5. Stem cell niches (2 hours).
6. Mechanisms of the stem cell self-renewal (2 hours).
7. Changing of the cell phenotype (2 hours).
8. Introduction to tissue engineering. Tissue appearance and development (embryogenesis) (2 hours).
9. Intercellular communications: nanotubes and vesicles (2 hours).
10. Tissue regeneration in animals. Regenerative medicine. Wound healing (2 hours).
11. Design principles in biomaterials and scaffolds. Biological scaffolds for regenerative medicine. Hydrogels (2 hours).
12. Surface modification of biomaterials. Histogenesis in three-dimensional scaffolds. Biocompatibility and bioresponse to biomaterials (2 hours).</td></tr>
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	13. Skin tissue engineering (2 hours). 14. Bone and cartilage tissue engineering (2 hours). 15. Regulation and ethics (2 hours). Seminars: Journal Club. Students' presentation and analysis of the scientific papers (15 hours) Exercises: 1. Microscopy of tissue sections: epithelial tissue, connective tissue, cartilaginous and bone tissue, muscle tissue and nervous tissue (7 hours) 2. Growth and differentiation of different stem cells type on scaffold (8 hours).

Format of instruction	☒ lectures ☒ seminars and workshops ☒ exercises ☐ *on line* in entirety ☐ partial e-learning ☐ field work	☐ independent assignments ☐ multimedia ☒ laboratory ☐ work with mentor ☐ (other)
Student responsibilities	The student must attend 70% of lectures, 100% of seminars and exercises, prepare seminar essay and take written 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	Research		Practical training	
	Experimental work	0,5	Report		(Other)	
	Essay		Seminar essay	0,5	(Other)	
	Tests		Oral exam		(Other)	
	Written exam	1	Project		(Other)	

Grading and evaluating student work in class and at the final exam	The final grade will be based on the results achieved by combination of seminar and written exam. Written exam and seminar contribute with 50% each in the final grade. The written exam will be evaluated using the following scale : < 50 % insufficient; 50-69 % sufficient (2), 70-79% good (3), 80-89% very good (4), 90-100% excellent (5).

Required literature (available in the library and via other media)	**Title**	**Number of copies in the library**	**Availability via other media**
	Lanza R. et al. Essentials of Stem Cell Biology, 2nd ed. (2009), Academic Press, London, UK		
	Atala A., Lanza R., Thomson J., Nerem R. Principles of Regenerative Medicine, 2nd ed. (2011), Academic Press, London, UK		

Optional literature (at the time of submission of study programme proposal)	1. Mescher A. Junqueira's Basic Histology: Text and Atlas, 15th ed. (2018), McGraw-Hill Education, New York, USA 2. Stein G. et al. Human Stem Cell Technology and Biology (2011), Wiley-BlackWell, USA
Quality assurance methods that ensure the	Quality monitoring will be performed at three levels: (1) University, (2) Faculty, (3) teacher.

acquisition of exit competences	
Other (as the proposer wishes to add)	