

<i>Name of the course</i>	How to construct your own organ?			Code	
<i>Type of study program Cycle</i>	Integrated studies – Medicine			Year of study	1
<i>Credits (ECTS) :</i>	2	<i>Semester</i>	2	Number of hours per semester (1+e+s)	15+10
<i>Status of the course:</i>	elective	<i>Preconditions:</i>		<i>Comparative conditions:</i>	
<i>Access to course:</i>	1 st year students			<i>Hours of instructions:</i>	
<i>Course teacher:</i>	Associate professor Sandra Kostić, PhD				
<i>Consultations:</i>					
<i>E-mail address and phone number:</i>	sandra.kostic@mefst.hr				
<i>Associate teachers</i>					
<i>Consultations:</i>					
<i>E-mail address and phone number:</i>					
<i>The aims of the course:</i>	The course objective is understanding the concept of production of regenerative biological materials (tissues and organs) and the basic principles of tissue engineering				
<i>Learning outcomes (general and specific competences):</i>	<p>Upon completion of the anatomy course, the successful student should acquire the following knowledge, skills and attitudes:</p> <p>A) Knowledge (REMEMBER, UNDERSTAND, APPLY, ANALYSE AND EVALUATE) measurable outcomes: (1) explain the main concepts of biotechnology and its role in biomedicine, (2) describe the similarities and distinguish the peculiarities of different types of biotechnology (3), explain and describe the basic principles in the production of regenerative biological materials (tissues and organs), (4) apply fundamental knowledge of biotechnology and tissue engineering on specific clinical situations, (5) recognize and name the most relevant achievements in the field of bioengineering of artificial organs and their therapeutic potential, (6) Describe, analyse and explain bioengineering process for the specific tissues and organs</p> <p>B) Skills (PERCEPTION, READY, GUIDANCE) measurable outcomes: (1) critically evaluate the choice of cells and bioreactors for tissue engineering, (2) communicate the latest achievements in the field of tissue engineering of the specific organs by reading and evaluating the latest literature and presenting your results in front of the students.</p> <p>C) Attitudes (ACCEPTANCE, REACTION, ACQUISITION OF</p>				

	VALUES) measurable outcomes: (1) take into account the positive and negative aspects of introducing the new technologies for human treatments, 2) accept the existence of multiple approaches for tissue engineering, such as 3D printing and decellularization for attaining the scaffold and react to different aspects of each approach (3) Describe and explain your perspectives on ethical aspects in the field of tissue engineering and regenerative medicine through specific examples of ethical issues and medical and scientific misconduct.			
Course content (Syllabus):	<u>Lectures:</u> Introduction to biotechnology; Bioengineering of the tissues and organs as an alternative to drugs, gene therapy and organ transplantation; The most relevant achievements in the field of bioengineering of artificial organs and their therapeutic potential The possibilities of using the cell culture for production of tissues and organs; Regenerative medicine – application of the stem cells; Application of the stem cells in research and the use of animal models 3D printers in biomedicine <u>Seminars:</u> Construction of the specific organs and tissues (skin, cartilage, bone, heart, bladder, blood vessels, vagina...) Ethical aspects in the field of tissue engineering and regenerative medicine Analysis of the scientific articles			
Format of instruction (mark in bold)	Lectures	Exercises	Seminars	Independent assignments
	Consultations	Work with mentor	Field work	Other
	Remarks: Students search for scientific articles going through PubMed data base to collect the data from the newest literature about specific organ. On that basis, students will prepare ppt presentation and present it in front of other colleagues.			
Student responsibilities	Final exam; searching the literature, active participation in lectures, seminars. Preparation of ppt.			
Screening student work (mark in bold)	Class attendance	Class participations	Seminar essay	Practical training
	Oral exam	Written exam	Continuous assesment	Essay
Detailed evaluation within a <i>European system of points</i> (<i>Example</i>)				

STUDENTS RESPONSIBILITIES	HOURS	PROPORTIONS OF ECTS CREDITS	PROPORTION S OF MARK
Class attendance and participations		0,5	
Seminar essay		0,5	30%
Written exam		1	70%
Oral exam			
<p>Further clarification: Assessment of students' performance will be based on their general activity during the course. It will include active participation in the debates, and preparation of the given units (articles) for the ppt on seminars.</p> <p>According to the regulations of the study, final grade is obtained: A = 91-100% 5 B = 79 to 90% 4 C = 67 to 78% 3 D = 55 to 66% 2 F = 0 to 54% 1</p>			
Required literature:	<p>1) Vacanti J. Tissue engineering and regenerative medicine: from first principles to state of the art. <i>J. Pediatr. Surg.</i> 2010;45(2):291–294. 2) Atala A. Regenerative medicine strategies. <i>J. Paediat. Surg.</i> 2012; 47:17–28. 3) Atala A (2009) Engineering organs. <i>Curr Opin Biotechnol</i> 20: 575-592. 4) Sheyn D, Mizrahi O, Benjamin S, Gazit Z, Pelled G, Gazit D. Genetically modified cells in regenerative medicine and tissue engineering. <i>Adv Drug Deliv Rev.</i> 2010; 62:683–98. Prilagođena literatura za studij dentalne medicine. 1) <u>Shilpa PS, Kaul R, Sultana N, Bhat S.</u> (2013) Stem cells: Boon to dentistry and medicine. <i>Dent Res J</i> 10 (2):149-54. 2) Krasner P, Verlander P. (2011) Stem cells in dentistry and medicine: The dentist's role. <i>Dent Today</i> 30(128):130–4. 3) Peng L, Ye L, Zhou XD. (2009) Mesenchymal stem cells and tooth engineering. <i>Int J Oral Sci</i> 1:6–12. 4) <u>Rai S, Kaur M, Kaur S.</u> (2013) Applications of stem cells in interdisciplinary dentistry and beyond: an overview. <i>Ann Med Health Sci Res</i> 3(2):245-54. 5) <u>Rai S, Kaur M, Kaur S, Arora SP.</u> (2012) Redefining the potential applications of dental stem cells: An asset for future. <i>Indian J Hum Genet</i> 18(3):276-84.</p>		
Optional literature:	<p>Meyer U, Meyer TH, Handschel J, Wiesmann HP (2009) <i>Fundamentals of Tissue Engineering and Regenerative Medicine</i>, Springer, New York</p>		
Additional			

**information about
the course**

Annexes: calendar classes

<i>The number of teaching units</i>	TOPICS AND LITERATURE
I.	Title: Introduction to biotechnology; Short description: Definition and the types of biotechnology; application of biotechnology in science and every-day life. Literature: required and optional
II.	Title: The basic principle of tissue engineering Short description: The principle of creating organs: cells, scaffolds and bioreactors Literature: required and optional
III.	Title: Tissue engineering of specific tissues and organs; Short description: Tissue engineering of blood vessels, heart, bone, cartilage, lungs... Literature: required and optional
IV.	Title: The most relevant achievements in the field of bioengineering of artificial organs and their therapeutic potential; Short description: The possibilities of using the cell culture for production of tissues and organs; Bioengineering of the tissues and organs as an alternative to drugs, gene therapy and organ transplantation Literature: required and optional
V.	Title: Ethical aspects of tissue engineering Short description: Ethical aspects of creating new organs and organisms and manipulating stem cells; Literature: required and optional