

APPLICATION OF CELL AND TISSUE CULTURE IN BIOMEDICAL RESEARCH	
GENERAL INFORMATION	
Course teacher	Prof. Ljubica Glavaš-Obrovac, MSc Biotechnol, PhD
Associates	Prof. Tatjana Belovari, MD, PhD Assoc. Prof. Stana Tokić, MBiolMol, PhD Asst. Prof. Marijana Leventić, MBiol, PhD Asst. Prof. Katarina Mišković Špoljarić, MEng, PhD Asst. Prof. Barbara Viljetić, MEd Biol. Chem, PhD
Study programme	Graduate University Study of Medical Laboratory Diagnostics
Course status	mandatory
Year of study, semester	1 st year, 2 nd semester
ECTS credits	5
Form of teaching (number of classes)	Lectures: 30; Seminars: 15; Laboratory exercises: 15
Expected number of students attending the course	20
COURSE DESCRIPTION	
Course objectives	
To enable students to acquire knowledge about cell and tissue cultivation methods, methods of monitoring basic cell growth parameters, as well as basic knowledge about working with cell cultures that would enable them to work independently with cell cultures.	
Course entry requirements and competencies needed for the course	
Completed courses at the Undergraduate Study Programme of Medical Laboratory Diagnostics or equivalent bachelor's degree (baccalaureate)	
Learning outcomes at study programme level	
1.1, 1.2, 2.1, 2.2, 2.4, 2.6, 2.7, 3.1, 3.2	
Expected learning outcomes at course level (5-10)	
After attending lectures, seminars, practicums, independent study, and passing the exam students will be able to: <ol style="list-style-type: none"> 1. critically evaluate methods and protocols for working in sterile conditions (manipulation with cells). 2. evaluate the medical application of stem cells. 3. use the equipment necessary for working with cell culture. 4. valorize published scientific papers in the field of cellular biomedicine. 5. carry out tests with cell culture. 6. valorize the results obtained from tests on the cell culture. 7. apply acquired knowledge for diagnostic purposes. 	
Course content	
<p>Lectures: Introduction to cell culture. Principles of cell culture. Biology of cells growing in the cell culture. Primary, permanent, and continuous cell cultures. Application of cell culture techniques in molecular medicine and diagnostics. Tissue engineering. Monoclonal antibodies production. Transfection and selection. Plasmid transfection. Use of viruses as vectors. RNAi transfection. Gene therapy. Embryo culture. Methods of determining viability and proliferative abilities of cells in the cell culture. Limitations of <i>in vitro</i> methods.</p> <p>Seminars: Cell culture - laboratory equipment. Methods for tools and equipment sterilization. Composition and preparation of cell growth media. Maintenance of cell lines. Advantages and disadvantages of application of the cell cultures in biomedicine (problem solving seminar).</p>	

Laboratory exercises: Methods of determining viability and proliferative abilities of cells in cell cultures. Determining DNA, RNA, and protein synthesis in cells. Cultivation and preparation of cells growing in the culture for enzymatic and immunocytochemical analyses.

Forms of teaching

Lectures; seminars; laboratory exercises; independent assignments

Students' responsibilities

Attendance is obligatory throughout all course forms, and the student has to attend all the exams. Student absence of up to 30% is considered acceptable in each teaching form. Practical work and seminars that were not completed have to be taken in the form of colloquiums.

Monitoring students' work (Connecting learning outcomes, teaching methods and evaluation)

Examination: written exam.

Teaching activity	ECTS	Learning outcome	Student activity	Evaluation methods	Grade points	
					Min.	Max.
Attending classes lectures	0.25	1-7	Attendance	Attendance records	1	5
Seminars	1.25	1,4	Presentation preparation	Presentation	9	25
Laboratory exercises	0.5	3,5,6	Completed practical work	Presentation accepted report	5	10
Examination (partial exams)	0.5	3,5,6	Entry colloquium for laboratory exercises	Partial exam	5	10
Final exam	2.5	1-7	Preparation for the final exam	Written exam	25	60
Total	5				50	100

Evaluation of written part of final exam

Percentage of correct answers (%)	Grade points
60.00-64.99	30
65.00-69.99	33
70.00-74.99	36
75.00-79.99	39
80.00-84.99	42
85.00-89.99	45
90.00-94.99	47
95.00-100	50

Formulating the final grade:

Grade points achieved in classes are combined with points achieved in the final exam. Grading system involves absolute grading and represents one's final achievement. Grades are numerically expressed as follows: A – excellent (5): 80-100 grade points; B – very good (4): 70-79.99 grade points; C – good (3): 60-69.99 grade points; D – sufficient (2): 50-59.99 grade points.

Assigned reading (available in the library and in other media)

Title	Number of copies in the library	Availability in other media
Glavaš-Obrovac, Lj; Gašparović, V. VI. Stanica 34. Funkcija i poremećaj stanične funkcije // Intenzivna medicina / Jukić, M ;	2	

Gašparović, V ; Husedžinović, I ; Majerić Kogler, V ; Perić, M ; Žunić, J (Ed.). Zagreb: Medicinska naklada, 2007. Pages 328-361.		
Glavaš-Obrovac, Lj., Baus M., Mišković K. Cell culture – internal exercise manual, 2012.		MEFOS Website, Merlin
Freshney RI: Culture of animal cells, a manual of basic technique, 4 th Edition, Wuley-Liss inc, 2000. New York, SAD	5	
Selected scientific and professional papers and links for e-learning		On line
Further reading		
Materials from lectures, seminars and exercises		
Quality assurance methods that ensure the acquisition of exit competencies		
Anonymous, quantitative, standardised students' opinion survey on the course and teacher's work, carried out by the Quality Assurance Office of the Faculty of Medicine in Osijek.		