

Study Programme : MSc in Biology			
Degree level: Master degree			
Course Title: Molecular methods in biological research			
Professor: dr Edward Petri, dr Nevena Veličković			
Required/Elective Course: required course			
Number of ECTS: 9			
Prerequisites: -			
Course Objective: The course objective is to adopt knowledge on specific methods for biomolecule secretion, concentration and activity detection. Also, students will improve their knowledge of molecular techniques application in physiology, medical diagnostic and population genetics. Students will obtain good laboratory skills including different histological techniques for cell and tissue preparation.			
Course Outcome: After successfully realized pre-exam and exam obligations student is able to: - explain methodology of different molecular techniques in research on structure and function of biologically important molecules, cells, tissues, and populations - correctly apply principles of good laboratory practice in the process of planning, performing and controlling experiments - demonstrate skills in laboratory work and use scientific literature			
Course Content: <i>Theoretical part</i> Cell cultures. Analysis of biomolecules secretion and concentration. Spectrophotometric and electrophoretic techniques. Application of chromogen, antibodies, enzymatic complexes, and different histochemical dyes. Determination of enzyme activity and enzyme kinetics. Molecular biology techniques application in physiology and medical diagnostics. Methods for genetic variability determination of structural and functional proteins. Molecular markers. Tissue preparation techniques. Histochemical methods for cell type and organelle determination. Bioanalysis for xenobiotics identification and determination. <i>Practical part</i> Primary and immortalised cell cultures. Methods for statistical and kinetics analysis of biomolecule secretion and concentration. Methods for qualitative and quantitative analysis of proteins: Western Blot, Immunoprecipitation, electrophoresis, isozyme differential staining. Gel analysis. Methods for enzyme activity and kinetics analysis. RT-PCR, RQ-PCR, cloning, mutagenesis, bacterial and mammalian expression vectors. SSRs, AS-PCR, AFLP, RAPD.			
Reading List: 1. Boyer R. Modern Experimental Biochemistry, 3 rd ed., Benjamin Cummings, 2000. 2. Sambrook J, Russel DW. Molecular Cloning: A Laboratory Manual. 3 rd Edition, CSHL, New York, 2001. 3. Hillis DM, Moritz C. Molecular Systematics. Sinauer, 1990. 4. Clark, G., Coalson, R. Nordquist, R., Scheider, H., Barthilomew., J., Mohr., J. Staining Procedures. The Williams & Wilkins, Baltimore, 1983. 5. Rajković, V. Basic Histological Techniques, extended handouts, 2005. (in Serbian)			
Total hours:			
Lectures: 2	Practicals:	Other: 4	Student research work: 5
Methods of instruction: Lectures, Lab. practicals			
Assessment (maximum number of points 100)			
Requirements	points	Final exam	points
Active participation in lectures	-	Final test	60
Active participation in practicals	20	Oral exam	-
Practicals – laboratory diary	20		
Remark: -			