

## Course Unit Descriptor

<b>Study Programme:</b> MSc in Biology
<b>Course Unit Title:</b> Experimental Microbiology
<b>Course Unit Code:</b> MB19
<b>Name of Lecturer(s):</b> Associate Professor Maja Karaman
<b>Type and Level of Studies:</b> Master degree
<b>Course Status (compulsory/elective):</b> elective
<b>Semester (winter/summer):</b> summer
<b>Language of instruction:</b> English
<b>Mode of course unit delivery (face-to-face/distance learning):</b> face to face
<b>Number of ECTS Allocated:</b> 5
<b>Prerequisites:</b> two passed microbiological exams
<b>Course Aims:</b> The goal of this course is to introduce the various analytical, molecular methods and techniques and the possibilities of their application in the study of microorganisms and products of microbial metabolism.
<b>Learning Outcomes:</b> After successfully completed pre-examination and examination commitments students can distinguish between different analytical techniques and methods such as HPLC, TLC, GS-MS, followed by spectrophotometric methods (UV / VIS photometry and flow-cytometry), fluorescence microscopy and to properly apply these methods in the detection, identification of microorganisms as well as their products. Master and apply the proper standard biochemical and molecular methods (electrophoresis, PCR, ELISA tests, etc.) in the examination of different groups of microorganisms and their metabolites to cope with understanding appropriate bioassays that are used in testing of bioactivities of microorganisms.
<b>Syllabus:</b> <i>Theory</i> 1) Basic analytical methods for detection, quantification and identification of microorganisms and their products of primary and secondary metabolism (application of chromatographic methods HPLC, TLC, GS-MS, etc.) 2) The application of spectrophotometric methods (UV/VIS spectrometry, flow-cytometry) and qualitative and quantitative studies of different groups of microorganisms and their metabolites 3) Fluorescence microscopy in microbiological research 4) Standard methods in molecular microbiological research 5) The application of electrophoresis in the detection and identification of metabolic products of MO 6) Methods for nucleic acid extraction and application of MO RFLP and RAPD analysis 7) PCR technique and enforcement in the investigation, identification and analysis of the MO and their products, as well as examination of microbial populations from different environments 8) The bioassay testing and application of them in detection of microorganisms and determination of their activities. <i>Practice.</i> 1) Microbial samples of biomass preparation for analysis by analytical methods (HPLC, TLC and others.) 2) Spectrophotometric analysis of specific metabolites of microorganisms (bacteria, cyanobacteria, algae, fungi) 3) quantitative analysis of certain groups of microorganisms by flow cytometry 4) Extraction methods of nucleic acids from different groups of microorganisms (bacteria, cyanobacteria, algae and fungi)
<b>Required Reading:</b> <ol style="list-style-type: none"><li>1. Sansonetti P and Zychlinsky A (2002): Methods in Microbiology-Molecular Cellular Microbiology. Academic Press, London, UK.</li><li>2. Maier R.M., Pepper I.L., Gerba Ch.P. (2000): Environmental microbiology. Academic press, London, UK. (selected chapters)</li><li>3. Paterson R.R.M. and Bridge P.D. (1994): Biochemical Techniques for filamentous fungi. International Mycological Institute, An Institute of CAB INTERNATIONAL.</li></ol>

4. Arora D.K. (2004): Handbook of Fungal Biotechnology. Marcel Dekker, Inc., New York, USA.

**Weekly Contact Hours:**      **Lectures: 2**      **Practical work: 2**

**Teaching Methods:** Lecture using Power Point presentation on the video beam, practical laboratory work

**Knowledge Assessment (maximum of 100 points):**

<b>Pre-exam obligations</b>	points	<b>Final exam</b>	points
Active class participation	5	written exam	20
Practical work	5	oral exam	40
Preliminary exam(s)	20	.....	
Seminar(s)	10		