

Course Unit Descriptor

<b>Study Programme:</b> MSc in Biology
<b>Course Unit Title:</b> MICROBIAL BIOACTIVE METABOLITES
<b>Course Unit Code:</b> MB21
<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> winter
<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> 7
<b>Prerequisites:</b> credit points of Chemistry, Cell Biology and credit points of Microbiology and of Biology of Algae and Fungi
<b>Course Aims:</b> A course designed to acquaint students with the principles of microbial culture isolation, cultivation and identification. Emphasis will be placed on understanding of microbial primary and secondary metabolism, as well as in developing skills for conducting simple biotechnological processes of microbial production of biologically active compounds.
<b>Learning Outcomes:</b> Enabling students for independent and individual experimental work in the field of microbial primary and secondary metabolism: experiment design, results obtaining and recording, analysis and interpretation of results, and elaboration and presentation, eventually use of new experience in conducting simple biotechnological processes of conversion of agriculture or industry by-products into high value bioactive products.
<p><b>Syllabus:</b></p> <p><i>Theory</i> Students get acquainted with the contemporary concept of understanding microbial secondary metabolism and effect of ecological factors on microbial metabolism, as the basis for microbial bioactive compounds production; Bacterial, cyanobacterial and algal bioactive metabolites, their nomenclature and classification. Fungi and lichens and their bioactive metabolites; Microbial bioactive agents in medicine and pharmacy (antibiotics, antitumor agents, antiviral agents), as biopesticides, biofertilizers, biosynthetic plasticsetc. Microbial metabolites in treating insomnia, cholesterolemia, as coagulants and anticoagulants, as tonics, angiotensins, cardiacs and aphrodisiacs, as sexual attractants and in cosmetics, as immunomodulators (immunoactivators and immunosuppressors). Microbial biotransformations (production of hormones, organic acids, alcohol). Microorganisms as the sources of healthy and organic food (vitamins, minerals, essential aminoacids). Microbial toxins (bacterial, cyanobacterial, algal, and fungal toxins); Mycetismus. Emphasis will be placed on research of microbial bioactive compounds, what should enable students to understand contemporary tendencies of use of microorganisms in different biotechnology fields, as well as to understand the microbial role and problems related to biologically active substances in the environment.</p> <p><i>Practice</i> Developing competence in experimental work: inoculation on media and cultivation procedure. Developing skills in results recording Methods of culture cultivation, conservation and procedures for culture maintenance. Cultivation with the aim of optimization of microbial growth in different conditions of experimental conditions, shifting from primary to secondary microbial metabolism. Through the practice, students get acquainted with the culturelle and physiological properties of isolated cultures of microorganisms. Research in production of antibiotics and antibiogram experiments.</p>
<p><b>Required Reading:</b></p> <ol style="list-style-type: none"> <li>1. Antoni H Rouz: (1975): Chemical microbiology. ICS Belgrad. (In Serbian).</li> <li>2. Pejin D: Industrial microbiology (2003): University of Novi Sad, Faculty of Technology. (In Serbian).</li> <li>3. Matavulj M, Gajin S, Petrović O, Radnović D, Svirčev Z, Simeunović J, et al.(1988): Biologically active compounds of higher plants, fungi, algae, and bacteria. Institute of Biologiju, Faculty of Sciences, University of Novi Sad. (In Serbian).</li> <li>4. Duraković S. and Duraković L (2003): Mycology in Biotechnology. Univversity of Zagreb, (In Croatian).</li> </ol>

5. M. Muntanjola – Cvetković: General Mycology. NIRO Književne novine, Belgrad. (In Serbian).
6. Svirčev Z (2005): Microalgae and Cyanobacteria in Biotechnology. Faculty of Sciences, University of N. Sad, (In Serbian).
7. Radnović D, Matavulj M, Karaman M (2007): Mycology. Faculty of Sciences, University of Novi Sad, WUS Austria ISBN 9787-86-7031-118-3. (In Serbian).
8. Vučetić J (1985): Microbial synthesis of antibiotics. KIZ“Centar“, Belgrad. (In Serbian).
9. Vučetić J, Vrvic M (1992): Microbial synthesis of vitamins. Nova prosveta, Belgrad. (In Serbian).
10. Vučetić J (1982): Microbial synthesis of aminoacids. Privredni pregled, Belgrad. (In Serbian).

<b>Weekly Contact Hours: 2</b>	<b>Lectures: 2</b>	<b>Practical work:5</b>
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**Teaching Methods:** lectures, practice, consultations, seminars, colloquia

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

<b>Pre-exam obligations</b>	points	<b>Final exam</b>	points
Active class participation	5	written exam	30
Practical work	5	oral exam	40
Preliminary exam(s)		...	
Seminar(s)	20		

Students will develop a deeper understanding of experimental work in microbiological laboratory through independent study. Part of the learning material will be available on the internet.