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| Study Programme : MSc in Biology | | | |
| Degree level: Master degree | | | |
| Course Title: MICROBIAL BIOTECHNOLOGY | | | |
| Professor: Dr Zorica Svirčev, Dr. Dragan Radnović | | | |
| Elective Course | | | |
| Number of ECTS: 7 | | | |
| Prerequisites: Credit points of Chemistry, Cell Biology and credit points of Microbiology and of Biology of Algae and Fungi. | | | |
| Course Objective: A course designed to acquaint students with the principles of microbial culture isolation, cultivation, identification, and use in biotechnological processes. Emphasis will be placed on understanding of microbial primary and secondary metabolism, as well as in developing skills for conducting simple biotechnological processes of production of biomass, biologically active compounds, and basic raw material bioconversion. | | | |
| Course Outcome: 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 nusproducts into high value bioactive products. | | | |
| Course Content: | | | |
| <i>Theoretical part:</i> Historical development of biotechnology microorganisms. Microorganisms of biotechnological importance. The general scheme of microbiological processes. The growth of microorganisms synthesis of primary and secondary metabolites. The application of genetic engineering of microorganisms in biotechnology. Techniques of cultivating microorganisms. The production of biomass. Bioreactors. Implementation and application options, and specific groups of microorganisms in biotechnology: applied microbiology, applied algology, applied mycology. Students get acquainted with the contemporary concept of understanding microbial metabolism and effect of ecological factors on microbial metabolism, as the basis for production of biomass and microbial bioactive compounds; bacterial, cyanobacterial and algal biomass and bioactive metabolites, their nomenclature and classification. Microorganisms and their bioactive metabolites in medicine and pharmacy (antibiotics, antitumor agents, antiviral agents, immunomodulators), as biopesticides, biofertilizers, biosynthetic plastics etc. Microbial biotransformations (production of hormones, organic acids, alcohols). Microorganisms as the sources of healthy and organic food (vitamins, minerals, essential aminoacids). Microbial toxins and mycetisms. 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. | | | |
| <i>Practical part:</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. Through the practicals, students get acquainted with the culture and physiological properties of isolated cultures of microorganisms. Cultivation with the aim of optimization of microbial growth in different conditions of experimental conditions, shifting from primary to secondary microbial metabolism. Research in production of antibiotics and antibiogram experiments. | | | |
| Reading List: 1. Antoni H Rouz: (1975): Chemical microbiology. ICS Belgrad. (In Serbian and in English). 2. Pejin D: Industrial microbiology (2003): University of Novi Sad, Faculty of Technology. (In Serbian). 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 Biology, Faculty of Sciences, University of Novi Sad. (In Serbian). 4. Duraković S. and Duraković L (2003): Mycology in Biotechnology. University of Zagreb, (In Croatian). 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. Vučetić J (1985): Microbial synthesis of antibiotics. KIZ“Centar“, Belgrad. (In Serbian). 8. Vučetić J, Vrvic M (1992): Microbial synthesis of vitamins. Nova prosveta, Belgrad. (In Serbian). 9. Vučetić J (1982): Microbial synthesis of aminoacids. Privredni pregled, Belgrad. (In Serbian). 10. Matavulj M, Svirčev Z, Petrović O (2011): Lecture outlines and Power-point presentations (In Serbian) 11. Madigan MT, Martinko JM (2006): Brock Biology of Microorganisms. Prentice Hall, Pearson Education International (In English) | | | |
| Total hours: | | | |
| Lectures: 2 | Practicals: 2 | Other: | Student research work: 5 |
| Methods of instruction: lectures, practicals, consultations, seminars, colloquia | | | |
| Assessment (maximum number of points 100) | | | |
| Requirements | points | Final exam | points |
| Active participation in lectures | 5 | Practical exam | 15 |
| Student seminars | 40 | Oral exam | 40 |
| Remark: - 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. | | | |