Name of the subject: BIOCHEMICAL METHODS IN MICROBIOLOGY

Teacher(s): Dr. Dragan Radnović

Status of the subject: elective

Number of ECTS points: 15

Condition: course selection is conditioned by prior consultations with the subject teacher in order to achieve the optimum form of engagement and certain subject tasks which in one part of the planned activities should be directed to the subject of the candidate's doctoral dissertation

Goal of the subject

The objective of the course is to acquire knowledge in the field of methodology for the study of metabolism and functional structure of microorganisms and to connect them with the current and potential possibilities of biotechnological application of microorganisms.

Outcome of the subject

After successful completion of pre-exam and exam obligations, the student should be able to:

- Explain the principle of biochemical methods used in microbiological research

- Independently perform and use appropriate biochemical methods that are necessary in investigation of microbial properties

- independently plans, realizes and processes the results obtained by applying appropriate biochemical methods Content of the subject

Theoretical lectures The concept and significance of biochemical methods applied in microbiology. Investigation of biochemical activities of microorganisms such as: use of different sources of nitrogen, extracellular enzymatic activity of microorganisms (dehydrogenase activity, amylolytic, cellulolytic, proteolytic activity, extracellular degradation of hydrocarbons and other substrates), testing of catabolism of proteins, carbohydrates and lipid metabolites, respectively their end products or intermediates. Application of specific biochemical properties in the detection of particular groups of microorganisms. Modern automated methods for rapid detection of biochemical properties of an unknown isolate. Application of chromatographic methods in microbiology. Methods for purification and identification of active metabolites such as antibiotics and bioactive proteins (enzymatic activity).

Practical lectures Team and independent work in the laboratory on current project tasks with the purpose of applying different biochemical methods in determining enzyme activities at the microbial community level by determining the biochemical properties of individual pure isolates, and determining their phenotypic similarity based on the results obtained using different biochemical methods.

Recommended literature

Harley, J., Prescott, L. (2002): Laboratory Exercises in Microbiology, Fifth Edition. The McGraw-Hill Companies, 2002 ISBN-10: 0072333456.

Benson, T. (2001) Microbiological Applications Laboratory Manual in General Microbiology. 8th Edition, The McGraw-Hill, New York.

Paterson, R.R.M., Bridge, P.D. (1994): Biochemical techniques for filamentous fungi. IMI Technical Handbooks, No. 1. CAB International, Surrey, UK.

Fox, A., Larsson, L., Morgan, S.L., Odham, G. (1990): Analytical Microbiology Methods. Chromatography and Mass Spectrometry. Springer Science+Business Media, Llc. ISBN 978-1-4899-3566-3.

V.K. Gupta et al. (eds.) (2013): Laboratory Protocols in Fungal Biology: Current Methods in Fungal Biology, in: Fungal Biology, DOI 10.1007/978-1-4614-2356-0_19, Springer Science+Business Media, LLC 2013

Review of the recent articles related to biochemical methods applied in microbiology

Number of active classes	Theory:5	Practice:5
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Methods of delivering lectures: Classes are taught according to a system of consultations in defined units. In agreement with the teacher and the mentor, the student selects a topic for a seminar paper that relates to biochemical methods in microbiology with the obligation to search the Internet and / or standard library documentation. Seminar work involves presentation on a given topic in the form of a presentation before a group and subject teacher and a defense at the end of the presentation. Journal club - presentation and discussion of scientific work in the field. Practical work is performed in the laboratory and through working visits to laboratories that have modern equipment that supports certain biochemical methods.

Evaluation of knowledge (maximum number of points 100): Assignment - up to 30, Seminar up to 30, Project Presentation of scientific work up to 10. Oral exam up to 30 points