

Study Programme : PhD Ecology
Degree level: PhD degree
Course Title: Toxins of microorganisms
Professor: Dr Zorica Svirčev
Elective Course
Number of ECTS: 15
Prerequisites: -
Course Objective: The aim of the course is to systematize the fundamental knowledge of microbial toxins, and to link these with the possibilities of application of microorganisms in biotechnology and environmental protection.
Course Outcome: Enabling students to independently deal with experimental work in the field of microbial toxicology: primary and secondary metabolism of microorganisms: experimental setup, execution and reading results, data analysis and interpretation, manuscript preparation and presentation.
<p>Course Content:</p> <p>The influence of environmental factors on metabolism; primary and secondary metabolites microorganisms as a basis for the production of microbial toxins, biotechnological processes in the production of bioactive substances; ecophysiology of microbial communities; bacteria and bacterial toxins, their nomenclature and classification of (exo-, endo- and mesotoxins). Localization of effects: effects on the cell membrane, direct effect on the internal components of the cell (cytotoxins), modification of functional activity (functional blocking agents), the effect on the interaction of cells and the intracellular substances (exfoliatins and erythrogenins). Importance of botulinum toxin, the toxin of <i>Clostridium tetani</i> and enterotoxin of <i>Staphylococcus aureus</i> and <i>E. coli</i>; cyanobacteria and cyanotoxins. Risks in recreational areas. Toxicity of water aquifers. Endemic nephritis and other diseases. Mechanisms of cyano- and phycotoxins in aquatic ecosystems. The presence of cyano- and phycotoxins in freshwater systems for recreation and water supply. The basic elements of monitoring and detection methods of cyano- and phycotoxins; fungi and mycotoxins: aflatoxins, ochratoxin, zearalenone, etc.. Mycetismus; microbial toxins as bioactive agents in the pharmaceutical and medical, as well as bio-pesticides, etc.; special attention will be devoted to research methodology of microbial toxins, which would enable the understanding of modern trends for application of microorganisms in various fields of biotechnology.</p> <p>Practical part:</p> <p>Special attention will be given to research methodology of microbial toxins, which will provide students with the knowledge about role that microbial toxins have in nature. Students should be actively involved in the experimental work in the research projects and transfers.</p>
<p>Reading List:</p> <p>1. Madigan M.T. and Martinko J.M. BROCK – Biology of Microorganisms. Pearson, Prentice Hall, Eleventh edition, 2006.</p>

2. Antoni H. Rouz (1975): **Hemijska mikrobiologija**. ICS Beograd;
3. Turnet W. B.: **Fungal metabolites**. Academic press, London..., 1971.
4. Grupa autora (Milan Matavulj, Slavka Gajin, Olga Petrović): **Biološki aktivne materije viših biljaka, gljiva, algi i bakterija**. Univerzitet u N. Sadu, PMF, Institut za biologiju, 1998.
5. Steve Prentis: **Biotehnologija – nova industrijska revolucija**, Školska knjiga, Zagreb, 1991
6. M. Muntanjola – Cvetković: **Opšta mikologija**. NIRO Književne novine, Beograd.
7. Chaudhry G.R. (editor): **Biological Degradation and Bioremediation of Toxic Chemicals**. Capman & Hall, London, 1994.
8. Svirčev Zorica: **Mikroalge i cijanobakterije u biotehnologiji**. PMF, Novi Sad, 2005.
9. Djarmati A. Šimon, Djarmati V. Danica: **Toksini biološkog porekla**. IP “Praktična knjiga”, Beograd, 1994.
10. Wiessner W., Schnepf E., Starr R.C. (1995). **Algae, Environment and Human Affairs**. Biopress Ltd., Bristol England
11. Радновић Д., Матавуљ, М., Караман М. (2007): **Микологија**. Издавач: Природно-математички факултет, Департман за биологију и екологију, Универзитет у Новом Саду. WUS Austria ISBN 9787-86-7031-118-3.
12. Chaudhry G.R. (editor): **Biological Degradation and Bioremediation of Toxic Chemicals**. Capman & Hall, London, 1994.

Total hours:				
Lectures: 5	Practicals:	Other:	Student research work: 5	

Methods of instruction:

Lectures, seminars, participation in scientific conferences and seminars; visiting microbiological laboratories, and active participation in the microbiological laboratory and within research projects. The student chooses the topics for the two assignments with the obligation to search the internet and/or standard library of documentation, in defined topics.

Assessment (maximum number of points 100)

During the semester, students will work on the seminar, which will be separately evaluated and entered in the final grade, and can achieve up to 60% of the points from the 100% maximum points on the final assessment (with 30% of the oral examination and 10% of the experimental work).

Remark: