Course Unit Descriptor

Study Programme: PhD in Biology

Course Unit Title: Phytoremediation

Course Unit Code: DNB029

Name of Lecturer(s): Milan Borišev, Slobodanka Pajević

Type and Level of Studies: Doctoral degree

Course Status (compulsory/elective): Elective

Semester (winter/summer):winter or summer

Language of instruction: English and Serbian

Mode of course unit delivery (face-to-face/distance learning): face-to-face

Number of ECTS Allocated: 15

Prerequisites: none

Course Aims: The course objective is application of plants in the field of phytoremediation followed by analyses of related physiological processes. During this course, students learn about specific phytoremediation categories depending on the physiology of plant species, growth forms and, ecosystem habitats and pollution properties on each contaminated site.

Learning Outcomes: By obtained knowledge student learn about applicative plant physiology in remediation of degraded and polluted environment. Specific physiological processes determine application of some plant species, with metabolic properties compatible with different types of pollutants. Students will use different methods to analyze phytoremediation potentials of specific plant growth forms and taxons

Syllabus:

Theory

Sources of environment pollution, Pollution influence to ecosystem stability and human health. Interactions of different pollutants with plants. Metabolic specificity of specific plant species and growth forms in phytoremediation. Application potentials of plants in bioremediation. Phytoremediation categories. Phytoremediation: economical and technological aspects. Methods of plant analyses in controlled phytoremediation tests. Phytoremediation development by using modern research.

Practice

Analyses of contaminated substances in plant samples collected in different polluted habitats. Experimental design aiming to investigate phytoremediation potentials of different plant species and growth forms. Physiological adaptations in conditions of elevated pollutant concentrations in controlled plant growth trials.

Required Reading: Mathew, A. Phytoremediation of heavy metal contaminated soil, (2006)

Ward, O.P., Singh, A. Applied Bioremediation and Phytoremediation. Springer (2004).

Heavy Metal Stress in Plants : From Biomolecules to Ecosystems, Prasad, M.N.V. (Ed.) (2004)

Phytoremediation and Rhizoremediation, Mackova Martina, Dowling David, Macek Tomas (Eds.) (2006).

Kvesitadze, G., Khatisashvili, G., Sadunishvili, T., Ramsden, J.J. Biochemical Mechanisms of Detoxification in Higher Plants: Basis of Phytoremediation (2006).

Phytoremediation: Transformation and Control of Contaminants. McCutcheon, S.C., Schnoor, J.L., (Eds.) New York:

Wiley (2003).

Phytoremediation (Advances in Biochemical Engineering / Biotechnology). David Tsao (Ed.), Springer, (2003).

Phytoremediation of Contaminated Soil and Water. Terry, N., Banuelos, G. (Eds.) Boca Raton: Lewis (2000).

Phytoremediation of Toxic Metals: Using Plants to Clean Up the Environment. Ilya Raskin, Burt D. Ensley (Eds.) (1999).

Weekly Contact Hours: 4	**Lectures:**2	**Practical work:**2

Teaching Methods:

Lectures, discussions in student working groups, laboratory work

Knowledge Assessment (maximum of 100 points):

Pre-exam obligations	points	**Final exam**	points
Active class participation	10	written exam	25
Practical work	10	oral exam	25
Preliminary exam(s)		…….	
Seminar(s)	30		

The methods of knowledge assessment may differ; the table presents only some of the options: written exam, oral exam, project presentation, seminars, etc.