Study Programme : PhD in Biology

Degree level: Doctoral degree

Course Title: Phytoremediation

Professor: Milan Borišev, Slobodanka Pajević

Required/Elective Course: elective course

Number of ECTS: 15

Prerequisites: previous consultation with a professor that will define form of engagement and course tasks depending on previous courses and current acquirements of a student

Course Objective: 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.

Course Outcome:

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.

Course Content:

Theoretical part 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.

Practical part 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.

Individual and team work in the laboratory on on-going project tasks in the field of genetic variability of animal populations, detection of genetic variability in natural populations, application of methods and programs of genetic conservation.

Reading List:

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).

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

Methods of instruction: theoretical lectures, laboratory and practical lessons, tutorials, reference research, seminars, experimental work

Assessment (maximum number of points 100)

Requirements

Seminar – 40; Oral exam - 60

Remark: