Study Programme: AGRONOMY

Course Unit Title: CHEMICAL AND BIOLOGICAL METHODS OF ECOSYSTEM STATUS ASSESSMENTS

Course Unit Code: 19.AGR090

Name of Lecturer(s): prof. Vojislava Bursić, PhD., prof. Aleksandra Petrović, PhD, doc. Ivana Ivanović, PhD

Type and Level of Studies: Doctoral academic studies

Course Status (compulsory/elective): elective

Semester (winter/summer): summer

Language of instruction: english

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

Number of ECTS Allocated: 7

Prerequisites: None

Course Aims:

Mastering the knowledge and skills in the field of subject content, which provides the basis for the identification and determination of animal species which are usually used as bioindicators, biomonitors and biomarkers, as well as the techniques for extraction and detection of chemical and biological pollutants and contaminants in different ecosystem matrices.

Learning Outcomes:

PhD student is qualified for the independent, theoretical, practical, field and scientific-research work in the field of chemical and biological methods of ecosystem status assessments.

Syllabus:

Theory

European trends in control and monitoring of ecosystem's status and pollution level. National and European regulations regarding maximum levels of pollutants and contaminants and monitoring. Knowledge of sampling techniques, sample handling, storaging, homogenization and analytes analysis in different matrices, specifying the validation criteria for analytical methods used for determination in accordance with valid EU documents. Causes of changes in biota. Bioindicators, biomarkers and biomonitors. The stress definition, plasticity and adaptation in the animal world. Environmental qualitative and quantitative assessments. Basic concepts and differences of residues, pollutants and contaminants. Formation and fate of residues and contaminants in the environment and behavior in ecosystems. Zooplankton, micro- and macroinvertebrates as bioindicators and biomonitors. Monitoring system protocols.

Practice

Matrix sampling in accordance with national and European directives. Determination and utilization of zooplankton and macroinvertebrates. Determination of residues and contaminants in the water and soil. The impact of pollution on certain plant and animal species. Acquaintance with the techniques for determining pollutants recommended by the European Union.

Required Reading:

Markert B. A., Breure A.M, Zechmeister H.G. (2003). Bioindicators and Biomonitors, Volume 6,1st Edition, Elsevier

Fontanetti C.S, Nogarol L.R., de Souza R., Perez D.G., Maziviero G.T (2011). Bioindicators and Biomarkers in the Assessment of Soil Toxicity, Open access peer-reviewed chapter

Fanali C., Haddad P.R. (2017). Liquid Chromatography: Fundamentals and Instrumentation (Handbooks in Separation Science), Elsevier; 2 edition.

Barr D.B (2008). Biological Monitoring: Theory and Applications—Bioindicators and Biomarkers for Environmental Quality and Human Exposure Assessment, National Institute of Environmental Health Science

Weekly Contact Hours:	**Lectures: 60**	**Practical work: 60**

Teaching Methods:

Oral presentation and consultations. Presentation, demonstration, and illustration methods for practical field and laboratory work, using specific sampling equipment for specific animal taxa, microscopes, and residual contamination apparatus. Practical laboratory and experimental methods.

Knowledge Assessment (maximum of 100 points):			
Pre-exam obligations	points	**Final exam**	points
Active class participation		written exam	30
Practical work	20	oral exam	50
Preliminary exam(s)		…….	
Seminar(s)			
The methods of knowledge assessment may differ; the table presents only some of the options: written exam, oral exam, project presentation, seminars, etc.			