(Table 5.2) Course unit description

Study program: Master of Academic Studies Chemistry – Environmental Protection
Type and level of studies: Master of Academic Studies
Course unit: Biophysical systems and environment
Teacher in charge: Ana D. Obradović
Language of instruction: English
ECTS: 5
Prerequisites:
Semester: summer semester
Course unit objective Providing students with the necessary knowledge about the basic principles of toxicology, the main groups of toxic pollutants, as well as their impact on the environment and the mechanisms of toxic action at the level of the organism, population and ecosystem. Introducing students to the latest discoveries and methods in the field of ecotoxicology, preserving and improving the quality of the environment, considering risk assessments of pollutants for humans, and pointing out biomarkers and their role in risk assessment.
Learning outcomes of Course unit Training students through lectures and independent work to apply acquired knowledge in the toxicokinetics of the most common groups of toxic pollutants, as well as to acquire practical knowledge and skills and apply methods and laboratory tests on certain model organisms, data processing and interpretation of results.
Course unit contents *Theoretical classes:* Variability of factors in the external and internal environment. The organism as a biophysical system of receptors, conductors and effectors. Homeostasis and biological control systems. Functional organization of the cell. Biomembranes: structure and function. Fate and behavior of xenobiotics in biological systems: penetration routes, transport, resorption, metabolism, bioaccumulation and excretion of toxic substances. Toxicity tests: in vivo and in vitro, acute and chronic, terrestrial and aquatic; biomarkers of toxicity. Doses in toxicology. Etiological factors: mechanical, physical, chemical, biological. Ecotoxicology in environmental monitoring: the impact of toxicants on living things and ecosystems; nonspecific and specific protection of the organism. The organism's response to stress. The functionality of the organism as a consequence of the balance of pro-oxidation and antioxidant protective systems. Biomonitoring studies and methods in assessing the risk of chemicals; preservation and improvement of environmental quality. *Practical classes:* Laboratory and field toxicity tests. Animal behavior tests. Growth and development inhibition tests. Enzyme inhibition and induction tests. Toxicity tests on various model organisms: acute and subacute, chronic and subchronic toxicity. Sublethal effects: monitoring of biochemical and physiological parameters. Dose-response relationship. LD50. Toxic effects of pesticides, some heavy metals and detergents. Ecotoxicological methods. Biomarkers and bioindicators.
Literature William C. Parke (2020). Biophysics: A Student's Guide to the Physics of the Life Sciences and Medicine, Springer Klaassen Curtis (2013). Casarett & Doull's Toxicology: The Basic Science of Poisons. New York, NY: McGraw-Hill Professional Harbison Raymond, Bourgeois Marie, Johnson Giffe (2015). Hamilton and Hardy's Industrial Toxicology. Hoboken, NJ:John Wiley & Sons, Inc.

Knut Schmidt-Nielsen (2008). Animal Physiology Adaptation and Environment, 5th Edition. Duke University, North Carolina				
Number of active teaching hours				
Lectures: 2	Practice: 2	Other forms of classes:	Independent work:	Other classes:
Teaching methods Theoretical teaching (Power Point presentations), seminar papers; Practical teaching: laboratory exercises and experiments on various model organisms, demonstrations, problem solving.				

Examination methods (maximum 100 points)			
Exam prerequisites	**No. of points**	**Final exam**	**No. of points**
Practical classes	**5**	Written examination	**20**
Tests	**10**	Oral examination	**50**
Homework	**5**	Other	
Seminars	**10**		
Project			

Grading system		
Grade	**No. of points**	**Description**
10	>= 91	Excellent
9	81-90	Exceptionally good
8	71-80	Very good
7	61-70	Good
6	51-60	Passing
5	<=50	Failing