Course Unit Descriptor

Study Programme: Doctoral Academic Studies in Environmental Protection, Doctoral Academic Studies in Chemistry

Course Unit Title: Selected Topics in Environmental Chemistry

Course Unit Code: DZZS-604

Name of Lecturer(s): Associate Professor Marijana Kragulj Isakovski

Type and Level of Studies: PhD degree

Course Status (compulsory/elective): Elective

Semester (winter/summer): Winter

Language of instruction: English

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

Number of ECTS Allocated: 15

Prerequisites: None

Course Aims:

The aim of the course is to improve students' knowledge of the physical and chemical processes that are important for a full understanding of the fate and behaviour of organic and inorganic pollutants in the environment.

Learning Outcomes:

Advanced and extended knowledge of the physical and chemical processes that occur in all segments of the environment, improved knowledge of students about modern methods of testing physical and chemical processes in the environment and the ability of students to make critical decisions necessary for successful quality control and environmental management.

Syllabus:

Theory

The laws of thermodynamics. Thermodynamics at interfaces and colloidal systems. Thermodynamic principles of multi-component systems. Ideal and non-ideal fluids, fugacity. Ideal and dilute solutions. Real solutions. The quantitative relationship between structure and reactivity. Partition between the gaseous, liquid and solid phases. Air-water partitioning. Soil-water partitioning. Soil-air partitioning. Kinetics and mechanisms of transformation reactions in the environment. Redox, catalytic and photolytic reactions in the environment. Transport of pollutants in the environment. Transport of pollutants by random motion. Transport of pollutants through boundaries. Special attention will be given to the study of specific problems that describe the behaviour of pollutants in certain segments of the environment (water-sediment, air, soil).

Practice

Development of projects on a selected topic from the curriculum.

Required Reading:

1. Schwarzenbach, R.P., Gschwend, P.M., Imboden, D.M.: Environmental Organic Chemistry – Second Edition, Wiley, 2003.
2. Manahan, S.E.: Environmental chemistry, Boca Raton: CRC Press, 2010.
3. Atkins, P.: Atkins' physical chemistry, Oxford University Press, New York, 2010.

Weekly Contact Hours: 10	**Lectures:** 5	**Practical work:** 5

Teaching Methods: Lectures, desk-study project, consultation.

Knowledge Assessment (maximum of 100 points): 100

Pre-exam obligations	points	**Final exam**	points
Project presentation	50	Oral exam	50