

(Table 5.2) Course unit description

<b>Study program:</b> Chemistry				
<b>Type and level of studies:</b> Bachelor academic studies				
<b>Course unit:</b> The chemistry of the atmosphere				
<b>Teacher in charge:</b> Biljana Petrovic				
<b>Language of instruction:</b> English				
<b>ECTS:</b> 5				
<b>Prerequisites:</b> /				
<b>Semester:</b> Winter semester				
<b>Course unit objective</b> The objective of this course is that students acquire certain theoretical and practical knowledge about the major characteristics of the atmosphere, chemical and photochemical processes in the atmosphere, pollutants and the effects (on local and global level) caused by uncontrolled emissions of pollutants.				
<b>Learning outcomes of Course unit</b> Students will be familiar with the chemical composition, the layers and the temperature profile of the atmosphere, changes in pressure, density, conductivity, horizontal and vertical movement of air masses, types of chemical and photochemical reactions, natural and anthropogenically emitted inorganic and organic pollutants, properties of particles in the atmosphere, dispersion of pollutants as well as different negative effects on global and local level caused by uncontrolled emission of pollutants. Students will also acquire the skills in experimental work related to testing of the amount of some pollutants in the atmosphere.				
<b>Course unit contents</b> <i>Theoretical classes:</i> This course will cover: Formation of the atmosphere. Functions and characteristics of the atmosphere. Layers of the atmosphere. Temperature profile of the atmosphere. Changes in atmospheric pressure and density. Electrical conductivity. Vertical and horizontal movement of air masses. Chemical kinetics of processes in the atmosphere. Photochemical, radical, acid-base and catalytic reactions. Components of the atmosphere. Atmospheric nitrogen, oxygen, carbon dioxide, water vapor, methane, ions and radicals. Sources of pollutants. Inorganic (sulfur compounds, nitrogen oxides, ammonia, carbon monoxide, carbon dioxide, gaseous fluorine and chlorine compounds, metals) and organic (aliphatic and aromatic hydrocarbons, carbonyl compounds, organic oxygen, nitrogen and sulfur compounds, organic halides) pollutants. Particles in the atmosphere. Dispersion of pollutants, Dry and wet deposition. Photochemical smog. Formation of photochemical smog. Mechanism of smog formation. Inorganic products of smog. Effects of smog. Acid rain. Homogeneous and heterogeneous catalytic oxidation of SO <sub>2</sub> . Effect of global rise of the temperature. "Greenhouse" effect. Nuclear winters. Ozone depletion. Chapman's theory. Global agreements and protocols for the protection of the ozone layer.  <i>Practical classes:</i> Practical classes include determination of the concentration of NO <sub>2</sub> (N-1-naphthiethylenediamine method), SO <sub>2</sub> (pararosaline method), SO <sub>2</sub> (hydrogen-peroxide method), soot, formaldehyde (chromotropic acid method), lead and ozone in the air. As part of the practical work, students will visit the Institute of Public Health in Kragujevac, an accredited institution for testing the air parameters.				
<b>Literature</b> 1. Stanley E. Manahan, <i>Environmental chemistry</i> , Lewis Pub., USA, 2000 2. Internal script for practical work prepared according to the Official procedures for determination of concentration of pollutants in the atmosphere by Institute of Public Health in Kragujevac				
<b>Number of active teaching hours</b>				<b>Other classes:</b>
Lectures: 2	Practice: 2	Other forms of classes:	Independent work:	

<b>Teaching methods</b>			
Lecture, colloquiums, practical exercises, seminar			
<b>Examination methods (maximum 100 points)</b>			
<b>Exam prerequisites</b>	<b>No. of points</b>	<b>Final exam</b>	<b>No. of points</b>
Practical classes	20	Written examination	
Tests	20	Oral examination	40
Homework		Other	
Seminars	20		
Project			
<b>Grading system</b>			
<b>Grade</b>	<b>No. of points</b>	<b>Description</b>	
10	>= 91	Excellent	
9	81-90	Exceptionally good	
8	71-80	Very good	
7	61-70	Good	
6	51-60	Passing	
5	<=50	Failing	