

<b>Title</b>	<b>Environmental Chemistry</b>						
<b>Code</b>	ZDOB04						
<b>Study Program</b>	Postgraduate Interdisciplinary Doctoral Study in Protection of Nature and Environment						
<b>Semester</b>	I.						
<b>ECTS</b>	6						
<b>Status</b>	Obligatory						
<b>Lecturer</b>	Ph.D. Valentina Pavić, assistant professor						
<b>Co-Lecturers</b>	-						
<b>Requirements for Enrolment</b>	No						
<b>Objectives</b>	<p>Providing a chemical basis for understanding contemporary environmental challenges with interdisciplinary approach. Learning basic chemical phenomena and interactions between chemicals and the environment. Introducing students with the sources, reactions, effects and transport of various contaminants in soil, water and air. To provide interdisciplinary research training for understanding the basic mechanisms by which physical, chemical and biological agents cause changes in the integrity of the ecosystem.</p>						
<b>Learning Outcomes</b>	<ol style="list-style-type: none"> <li>1. define the concept of ecosystems and understand the ecosystem's chemical properties</li> <li>2. knowing the range and chemistry of compounds in the hydrosphere, lithosphere and atmosphere</li> <li>3. perceive the importance of the interactions between chemicals and the environment in homeostasis development of biological system</li> <li>4. describe the sources of heavy metals and radionuclides in the environment</li> <li>5. describe important chemical reactions in the atmosphere, including the smog formation, chemistry of ozone and acid rain</li> <li>6. understanding of chemical methods employed for environmental problem solving</li> <li>7. acquire skills in environmental sampling and designing sampling protocol</li> <li>8. acquire laboratory skills needed for quantifying methods of contaminants in environmental matrices</li> <li>9. interconnect theoretical knowledge acquired in class and develop an understanding of safety responsibilities residing in working on environmental problems</li> </ol>						
<b>Connection between Learning Outcomes, Curricular and Student Activities</b>	<b>Student Activities</b>	<b>ECTS</b>	<b>Learning Outcomes</b>	<b>Curricular Activities</b>	<b>Methods of Assessment</b>	<b>Credits*</b>	
						<b>min</b>	<b>max</b>
	Course presence	1	1-5	Lectures	Evidence	5	10
	Seminar presence, seminar work	2	6	Seminars	Evidence, seminar work evaluation	15	40
	Practice with active involvement	1	7-9	Practice	Evidence, evaluation	15	20
	Written examination (or partial exams)	2	1-9	Written examination	Oral exam	15	30
<b>Total</b>	<b>6</b>				<b>50</b>	<b>100</b>	
<b>Consultations</b>	According to the agreement with the students.						

Learning Activities	Lectures	Seminars	Practice
Hours	15	5	5
Contents / Teaching Units	<p><b>LECTURES:</b> Ecosystem, life cycle and the role of energy. Sources of pollutants in the environment: natural and artificial. Transport processes and chemical reactions that determine the fate of chemical substances in the environment. Chemistry of the lithosphere, hydrosphere and atmosphere. Conventional pollution of groundwater and soil. Biogeochemical cycles. Toxic organic chemicals. Traces of heavy metals and radionuclides, speciation and interaction with biota. Atmospheric chemistry of acid rain, greenhouse gases and ozone.</p> <p><b>SEMINARS:</b> Alternative Energy. Overview of compounds with hormone disruptive effect. Molecular basis for the greenhouse effect. Toxic contaminants. Redox reactions and microbial processes. The impact of toxic compounds in the environment: natural and artificial.</p> <p><b>PRACTICE:</b> Quantification methods for contaminants in environmental matrices. Collection of samples in the environment. Designing the sampling protocol.</p>		
Obligatory Literature	<ol style="list-style-type: none"> <li>1. vanLoon, G.W., Duffy, 2011: S. J. Environmental Chemistry: A global perspective 3<sup>rd</sup> Edition, Oxford University Press: Oxford.</li> <li>2. Lollar, B.S. ( Ed.), 2005: Environmental Geochemistry, Elsevier, Amsterdam.</li> <li>3. Girard, J.E., 2005: Principles of Environmental Chemistry 1<sup>st</sup> Edition, Jones and Bartlett Publishers, Inc.: Sudbury.</li> <li>4. Buell, P., Girard J.E., 2003: Chemistry Fundamentals: An Environmental Perspective 2<sup>nd</sup> Edition, Jones and Bartlett Publishers, Inc.: Sudbury.</li> </ol>		
Recommended literature	Relevant review articles and scientific monographs.		
Requirements for Aquiring Signature	Students class participation is recommended.		
Type of Exam	Active participation which includes preparation and presentation of the seminar work which makes 70% of the final grade, and the oral part of the exam makes 30% of the final grade. Before the oral part, students are obligated to prepare and present seminar.		
Lectures Language	Croatian, English		
Quality Monitoring	Survey questioning and the possibility of oral or written reviews after lectures, presentations, seminars or oral examination.		