

Title	ANALYSIS OF ORGANIC AND INORGANIC POLLUTANTS					
Code	ZDIK33					
Study Program	Postgraduate Interdisciplinary University Study Programme Environment Protection and Nature Conservation					
Semester	III.					
ECTS	5					
Status	elective					
Lecturer	Marijan Ahel, senior scientist, PhD					
Co-Lecturers	Nevenka Mikac, senior scientist, PhD					
Requirements for Enrolment	University degree in Natural or Biotechnical Sciences					
Objectives	Getting knowledge about the most important types of anthropogenic contaminants and methods for their determination in environmental samples with a special emphasis on the application of modern instrumental techniques for highly specific analysis of individual compounds and/or elements.					
Learning Outcomes	<ol style="list-style-type: none"> 1. Acquaintance with main types of pollutants and principles of selecting priority pollutants 2. Sampling and sample preservation techniques 3. Acquaintance with the most important procedures for environmental sample treatment 4. Acquaintance with the instrumental techniques for the analysis of inorganic and organic pollutants 5. Procedures for the determination of most important groups of inorganic and organic pollutants 					
Connection between Learning Outcomes, Curricular and Student Activities	Student Activities	ECTS	Learning Outcomes	Curricular Activities	Methods of Assessment	Credits*
						min max
	Activity during lectures	0,5	1-5	Lectures		
	Preparation of seminar	3,5	1-5	Seminar presentation	Evaluation of presentation	
	Preparation for oral exam	1,0	1-5	Final exam	Oral exam	
Total	5					
Consultations	According to students demands					
Learning Activities	Lectures		Seminars		Practice	
Hours	15		4		6	
Contents / Teaching Units	<ol style="list-style-type: none"> 1. Definition, classification and main types of pollutants; inventory of pollutants – priority pollutants 2. Sampling, sample preservation and sample treatment 3. Qualitative and quantitative analysis 4. Methods for enrichment and fractionation of organic pollutants 5. Spectroscopic methods 6. Chromatographic methods 7. Hyphenated techniques - GC/MS, LC/MS, ICP/MS, GC-ICPMS, LC-ICPMS 8. Methods for determination of metals and metalloids 9. Methods for determination and speciation of organometallic compounds 10. Determination of specific organic pollutants – hydrocarbons, chlorinated insecticides and polychlorinated biphenyls, herbicides, volatile halogenated hydrocarbons, phenolic compounds, surfactants 					
Obligatory Literature	<ol style="list-style-type: none"> 1. Perez-Bendito D.; Rubio S., Environmental Analytical Chemistry, Elsevier Science, Amsterdam, 1999, 842 pp. 					

	<ol style="list-style-type: none"> 2. Barcelo, D. (Ed.) Environmental Analysis. Techniques, Applications and Quality Assurance, Elsevier Science, 1993, 658 pp. 3. Mester, Z., Sturgeon R., Sample preparation for trace element analysis, Comprehensive Analytical Chemistry (Barcelo D., ed.), Vol. XLI, Wilson & Wilson's, 2003, 1286 pp. 4. Lobinski R., Marczenko Z. Spectrochemical trace analysis for metals and metalloids, Comprehensive Analytical Chemistry (Weber S.G., ed.) Vol. XXX, Wilson & Wilson's, 1996, 808 pp.
Recommended literature	<ol style="list-style-type: none"> 1. Kebbekus B.B.; Mitra S. (Eds.), Environmental Chemical Analysis, Blackie, London, 1998, 330 pp. 2. Schwarzenbach, R.P.; Gschwend; P.M.; Imboden, D.M., Environmental organic chemistry, John Wiley & Sons, Inc., New Jersey, USA, 2003, 1313 pp. 3. Craig, P.J, editor, Organometallic compounds in the environment, John Wiley & Sons, 2003, 434 pp.
Requirements for Aquiring Signature	Attendance at lectures or consultations
Type of Exam	Presentation of seminar and oral exam
Lectures Language	Croatian; English
Quality Monitoring	Survey after classes