

NAME OF THE COURSE		Analytical chemistry II				
Code	PMC104	Year of study	2.			
Course teacher	Ivica Ljubenkov, associate professor	Credits (ECTS)	4.0			
Associate teachers	Ivana Mitar, assistant professor	Type of instruction (number of hours)	L	S	E	F
			30	15		
Status of the course	obligatory	Percentage of application of e-learning	10 %			
COURSE DESCRIPTION						
Course objectives	Understanding of basic principles and application of instrumental methods.					
Course enrolment requirements and entry competences required for the course	Completed course General Chemistry I and II.					
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	<p>The student will be qualified to:</p> <ol style="list-style-type: none"> <li>1. explain the physic-chemical fundamentals of method of instrumental analysis,</li> <li>2. distinguish methods by types of testing,</li> <li>3. participate in selection of the appropriate test method according to the types of samples to be tested and</li> <li>4. participate in explanation and interpretation of the results of analyzes.</li> </ol>					
Course content broken down in detail by weekly class schedule (syllabus)	<p>LECTURES:</p> <ol style="list-style-type: none"> <li>1. Introduction to electrochemistry</li> <li>2. Potentiometry</li> <li>3. Electrogravimetry, Coulometry</li> <li>4. Voltammetry</li> <li>5. Introduction to spectroscopic methods,</li> <li>6. Instruments in spectroscopy</li> <li>7. UV-Vis, Fluorescence spectroscopy</li> <li>8. IR, and Raman spectroscopy</li> <li>9. Atomic spectroscopy, XRF</li> <li>10. Mass spectrometry</li> <li>11. NMR+EPR</li> <li>12. Introduction to chromatographic methods, TLC, Column chromatography spectroscopy</li> <li>13. Gas chromatography</li> <li>14. Liquid chromatography, HPLC</li> <li>15. Chromatography-Size ex., Ion, Affinity, Supercritical</li> </ol> <p>SEMINAR: Solving numerical examples related to the theoretical material covered.</p>					
Format of instruction	x lectures x seminars and workshops <input type="checkbox"/> exercises <input type="checkbox"/> <i>on line</i> in entirety <input type="checkbox"/> partial e-learning	<input type="checkbox"/> independent assignments <input type="checkbox"/> multimedia <input type="checkbox"/> laboratory <input type="checkbox"/> work with mentor <input type="checkbox"/> (other)				

	<input type="checkbox"/> field work					
Student responsibilities	Students are required to attend classes (lectures 70 % and seminars 100 %) and actively participate in the teaching process. That will be recorded and evaluated in making a final assessment.					
Screening student work (name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)	Class attendance	0.5	Research		Practical training	1
	Experimental work		Report		(Other)	
	Essay		Seminar essay		(Other)	
	Tests		Oral exam	1	(Other)	
	Written exam	1.5	Project		(Other)	
Grading and evaluating student work in class and at the final exam	<p>The final grade for the course will consist of a written (seminar) and an oral part (lecture). The written part may be taken in whole or in part by partial examinations during the semester. The exams will be graded as follows:  more than 60% - adequate,  more than 70% - good,  more than 80% - very good and  more than 90% - excellent.</p> <p>The oral part of the examination is taken by the students after successfully passing the written examination (partially or completely).</p>					
Required literature (available in the library and via other media)	<b>Title</b>			<b>Number of copies in the library</b>	<b>Availability via other media</b>	
	1. D. A. Skoog, D. M. West, F. J. Holler and S. R. Crouch, Fundamentals of Analytical Chemistry, 9 <sup>th</sup> Edition, Thompson Brooks/Cole, Belmont, USA, 2014.			10		
Optional literature (at the time of submission of study programme proposal)	1. R. Kellner, J. M. Mermet, M. Otto, M. Valcarcel and H. M. Widmer, Analytical Chemistry (A Modern Approach to Analytical Science, Second Edition), Wiley-VCH, Verlag GmbH & Co. KGaA, Weinheim, 2004. D. C. Harris, Quantitative Chemical Analysis, W. H. Freeman and Company, 41 Madison Avenue New York, NY, 2016. 3. B. M. Tissue, Basic of Analytical Chemistry and Chemical Equilibria, John Wiley & Sons, Inc., Hoboken, New Jersey, NY, 2013. 4. G. D. Christian, P. K. Dasgupta, K. A. Schug, Analytical Chemistry, John Wiley & Sons, Inc., 111 River Street, Hoboken, New Jersey, NY, 2014.					
Quality assurance methods that ensure the acquisition of exit competences	Quality of the teaching and learning, monitored at the level of the (1) teachers, accepting suggestions of students and colleagues, and (2) faculty, conducting surveys of students on teaching quality.					
Other (as the proposer wishes to add)						