



<b>Course ID:</b> HZO113	<b>Course name: METROLOGY IN CHEMISTRY</b>		
<b>Cycle: SECOND</b>	<b>Year: FIRST</b>	<b>Semester: I</b>	<b>ECTS credits: 4</b>
<b>Course status: MANDATORY</b>	<b>Total course hours: 60</b> Lectures: 30 Laboratory: 30		
<b>Teaching participants:</b>	<b>Teachers and associates with expertise in the field to which the subject belongs</b> [do not enter names in this section. Leave the wording as indicated in this section]		
<b>Prerequisite for enrollment:</b>	-		
<b>Course aims:</b>	Acquiring of basic knowledge of metrology in chemistry		
<b>Thematic course units:</b>	<ol style="list-style-type: none"><li>1. Metrology, basic terms and definitions</li><li>2. International and national metrology</li><li>3. Quality control and quality assurance QC/QA</li><li>4. Metrology and quality of results, requirements of ISO 17025</li><li>5. Traceability of measurement, use of CRM's and CRE's</li><li>6. Validation of testing methods</li><li>7. Validation by systematic analysis of parameters</li><li>8. Knowledge Test</li><li>9. Measurement uncertainty - a mathematical model</li><li>10. Measurement uncertainty - data validation methods</li><li>11. Statistical methods in metrology</li><li>12. Internal quality control - control charts</li><li>13. ANOVA test comparison methods</li><li>14. Interlaboratory comparison of results</li><li>15. BAS Legislation</li></ol>		
<b>Learning outcomes:</b>	The student will be able to: present the principles of metrology in chemistry, describe and fulfill the requirements of ISO 17025, determine the values of validation parameters (LOD, LOQ, accuracy, precision, robustness), assess the measurement uncertainty of the results		
<b>Teaching methodology:</b>	Lectures (oral presentation of teachers - presentations) and laboratory exercises (practical work)		

<b>Assessment methods and grading system<sup>1</sup>:</b>	<b>Grading criteria</b>		
	Criteria	Maximal score	Required score
	1. Class attendance	5	3
	2. Class activities *	15	8
	3. Midterms	40	22
	4. Final exam	40	22
	Total	100	55
	*Class activity is scored through the engagement of students in exercises.		
	<b>Scores and grading</b>		
	Score	Grade (B&H)	Grade (ECTS)
	< 55	5	F, FX
	55-64	6	E
65-74	7	D	
75-84	8	C	
85-94	9	B	
95-100	10	A	
<b>Literature<sup>2</sup>:</b>	<p>Supplementary literature:</p> <ol style="list-style-type: none"> <li>1. Muhić-Šarac T. Kvalitet u analitičkoj hemijskoj laboratoriji (Internaskripta). Sarajevo: Prirodno-matematički fakultet; 2008.</li> <li>2. Quantifying Uncertainty in Analytical Measurement. 3rd ed. Eurachem/Citac Guide, 2012.</li> <li>3. Sljedivost mjerne ispitne opreme premanacionalnim metalima. EA-4/07 Zagreb: Državni zavod za mjeriteljstvo, 2008.</li> <li>4. The Fitness for Purpose of Analytical Methods: A Laboratory Guide to Method Validation and Related Topics, Eurachem/Citac Guide, 2014.</li> </ol>		

<sup>1</sup>The grading structure for each subject is determined by the Council of the organizational unit before the beginning of the academic year in which the subject is taught as per Article 64, paragraph 6 of the Law on Higher Education of Sarajevo Canton

<sup>2</sup>The Senate of the higher education institution, as an institution, or the Council of the organizational unit of the higher education institution, as a public institution, determines by a special decision, which is published on its website before the beginning of the academic year obligatory, mandatory and recommended textbooks and manuals, as well as other recommended literature based on which exams are prepared and taken as per Article 56, paragraph 3 of the Law on Higher Education of the Sarajevo Canton