Course ID: HAHI04	**Course name: SENSORS AND ANALYSIS**		
Cycle: SECOND	**Year: FIRST**	**Semester:** I	**ECTS credits: 4**
Course status: ELECTIVE		**Total course hours: 60** Lectures: 30 Laboratory: 30	
Teaching participants:	**Teachers and associates with expertise in the field to which the subject belongs** [do not enter names in this section. Leave the wording as indicated in this section]		
Prerequisite for enrollment:	-		
Course aims:	The aim is to acquaint students with the theoretical basis, practical implementation and application of chemical sensors for chemical analysis and monitoring of quality and environmental protection.		
Thematic course units:	1. Introduction: Sensor definition, historical development, classification sensor 2. Main characteristics and parts of each sensor system 3. Chemical sensors - Classification, specification and nomenclature 4. Electrochemical sensors: potentiometric, amperometric sensors 5. Ion-selective electrodes, modified electrodes, microelectrodes 6. Conductometric sensors 7. Gas sensors - Chemoresistors 8. Optical sensors - optodes 9. Sensors based on dispersion, absorption, scattering, and fluorescence 10. O_2 -Optode; pH-Optoda; CO_2 - Optoda; Na^+, K^+ and Ca^{2+} - Optode 11. Mass and thermal sensors 12. Application of chemical sensors 13. Sensors applicable in industry and environmental analysis, advantages and shortcomings of chemical sensors		
Learning outcomes:	Knowledge: After successfully completing the course, students will acquire general knowledge about the origin and development of sensors and their distribution. Skills: Enabling students for independent work and applying		

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<tr><td></td><td>chemical sensors.
Competences: Understanding the principles of operation of different types of sensor systems.</td></tr>
<tr><td>Teaching methodology:</td><td>Oral presentation
Practical work</td></tr>
<tr><td>Assessment methods and grading system[1]:</td><td>
<table>
<tr><th colspan="3">Grading criteria</th></tr>
<tr><th>Criteria</th><th>Maximal score</th><th>Required score</th></tr>
<tr><td>1. Class attendance</td><td>5</td><td>3</td></tr>
<tr><td>2. Class activities *</td><td>15</td><td>8</td></tr>
<tr><td>3. Midterms</td><td>40</td><td>22</td></tr>
<tr><td>4. Final exam</td><td>40</td><td>22</td></tr>
<tr><td>Total</td><td>100</td><td>55</td></tr>
</table>
* Class activity is sccored through the engagement of students in exercises.
<table>
<tr><th colspan="3">Scores and grading</th></tr>
<tr><th>Score</th><th>Grade (B&H)</th><th>Grade (ECTS)</th></tr>
<tr><td>< 55</td><td>5</td><td>F, FX</td></tr>
<tr><td>55–64</td><td>6</td><td>E</td></tr>
<tr><td>65–74</td><td>7</td><td>D</td></tr>
<tr><td>75–84</td><td>8</td><td>C</td></tr>
<tr><td>85–94</td><td>9</td><td>B</td></tr>
<tr><td>95–100</td><td>10</td><td>A</td></tr>
</table>
</td></tr>
<tr><td>Literature[2]:</td><td>Mandatory literature:
1. -
Supplementary literature:
1. U. E. Spichiger-Keller, (1998), Chemical Sensors and Biosensors for Medical and Biological Applications, WILEY VCH Verlag GmbH, Weinhem, Germany;
2. J. Wang, (1994), Analytical Electrochemistry, VCH Publisher, Inc. USA;
3. F. S. Ligler, (2002), Optical Biosensors: Present and Future, Elsevier;
4. B. R. Eggins, (2002), Chemical Sensors and Biosensors, John Wiley & Sons Ltd., New York;
5. P. A. Oeberg, T. Togawa, J. Hesse, J. W.</td></tr>
</table>

[1] 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

[2] 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