



Course ID: HOA408	Course name: SENSORS AND BIOSENSORS		
Cycle: FIRST	Year: FORTH	Semester: VIII	ECTS credits: 3
Course status: ELECTIVE	Total course hours: 45 Lectures: 30 Laboratory: 15		
Teaching participants:	Teachers and associates with expertise in the field to which the subject belongs		
Prerequisite for enrollment:	-		
Course aims:	Introducing students to chemical sensors and biosensors as alternative analytical methods, which, due to their universality, are increasingly being applied both in everyday life and in scientific research work.		
Thematic course units:	<ol style="list-style-type: none">1. Chemical sensors as alternative analytical methods. Characterization, specification and nomenclature of chemical sensors.2. The concept of chemical and biochemical sensors. Trends in the development of sensor technologies, miniaturization and nanotechnology.3. Fundamentals of sensor physics, sensor chemistry, chemical balance, redox balance, electrochemical phenomena, sensor technologies.4. Mass sensors. Sensors based on electrical capacity and conductivity. Thermometric and calorimetric sensors.5. Electrochemical sensors: potentiometric sensors, amperometric sensors, sensors based on other electrochemical methods.6. Electrochemical biosensors, enzyme biosensors, immunosensors, sensors based on tissues of organisms, microorganisms and parts of organs.7. Biosensors based on nucleic acids, sensors with and for DNA, DNA diagnostics and "genetic fingerprint".8. Optical sensors and biosensors.9. Chemical sensors as detectors and indicators.10. Sensor arrays (batteries) and miniaturized total-analyzers.11. Nano sensors.12. Application of chemical sensors in industry, environment		

	and medicine.																																													
Learning outcomes:	<p><i>Knowledge:</i> Define and classify chemical sensors and biosensors and explain the principles and manner of their operation.</p> <p><i>Skills:</i> Select the appropriate sensor for application in different areas. Argue the results obtained using sensors.</p> <p><i>Competences:</i> Adoption of an interdisciplinary approach in the development and use of chemical sensors and biosensors.</p>																																													
Teaching methodology:	Method of oral presentation, method of conversation, method of discussion, method of practical work.																																													
Assessment methods and grading system¹:	<table border="1"> <thead> <tr> <th colspan="3">Grading criteria</th> </tr> <tr> <th>Criteria</th> <th>Maximal score</th> <th>Required score</th> </tr> </thead> <tbody> <tr> <td>1. Class attendance</td> <td>5</td> <td>2</td> </tr> <tr> <td>2. Class activities</td> <td>5</td> <td>3</td> </tr> <tr> <td>3. Midterms</td> <td>45</td> <td>25</td> </tr> <tr> <td>4. Final exam</td> <td>45</td> <td>25</td> </tr> <tr> <td>Total</td> <td>100</td> <td>55</td> </tr> <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> </tbody> </table>	Grading criteria			Criteria	Maximal score	Required score	1. Class attendance	5	2	2. Class activities	5	3	3. Midterms	45	25	4. Final exam	45	25	Total	100	55	Scores and grading			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
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Literature²:	<p>Mandatory literature:</p> <ol style="list-style-type: none"> Turkušić E. Uvod u hemijske senzore i biosenzore. Sarajevo: Prirodno-matematički fakultet; 2012. <p>Supplementary literature:</p> <ol style="list-style-type: none"> Švancara I, Kalcher K, Walcarius A, Vytras K. Electroanalysis With Carbon Paste Electrodes. Boca Raton: CRC Press; 2012. 																																													

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

