

(Table 5.2) Course unit description

Study program : Chemistry				
Type and level of studies: Doctoral Academic Studies				
<b>Course unit: Modern electrochemical and optical methods in analytical chemistry</b>				
<b>Teacher in charge :</b> Stanić D. Zorka, associate professor				
<b>Language of instruction (English or other foreign language):</b> English				
ECTS:15				
Prerequisites: Enrolled study program				
<b>Semester (Winter Semester or Summer Semester):</b> Winter semester				
<b>Course unit objective</b>				
The aim of this course is to make student able to complete their theoretical and practical knowledge in various fields of modern electrochemical and optical methods of instrumental analysis that have significant application in analytical chemistry.				
<b>Learning outcomes of Course unit</b>				
The student should be familiar with the basic knowledge of elementary principles of modern instrumental methods of analytical chemistry. After this course they will be able to properly make the selection and appropriate analytical methods in the analysis of real samples and will have ability to optimize and improve the applied methods in the analysis of specific samples.				
<b>Course unit contents</b>				
<i>Theoretical classes</i>				
The principles of modern electrochemical and optical instrumental methods of analysis. Classification of analytical methods. Types of instrumental method. Instruments for analysis. Potentiometric measurement and ion-selective electrodes. Electrochemical biosensors and nanosensors. Electrochemical separation methods. Pulse polarography. Cyclic voltammetry. Stripping voltammetry. Voltammetry with ultramicrofibres electrodes. Atomic spectroscopy. Molecular spectroscopy. X-ray spectroscopy. Mass spectrometry. Nuclear magnetic resonance spectroscopy. Method of activation analysis. Theoretical classes also includes the combined instrumental methods, automation of instrumental methods of analysis, validation of modern instrumental methods, application of modern electrochemical and optical methods in analysis of samples in the environment.				
<i>Practical classes</i>				
<b>Literature</b>				
<ol style="list-style-type: none"> <li>1. D. A. Skoog, J. J. Leary, Principles of Instrumental Analysis, fourth edition, Saunders College Publishing, New York, 1992.</li> <li>2. J. Wang, Analytical Electrochemistry, Wiley-VCH, New York, 2000.</li> <li>3. J.R. Dean, Methods for Environmental Trace Analysis, Wiley, 2003.</li> <li>4. . Harvey: Modern Analytical Chemistry, McGraw-Hill, Boston, 2000.</li> <li>5. M. Csuros: Environmental sampling and analysis for technicians, Lewis publishers, USA, 1994.</li> </ol>				
<b>Number of active teaching hours</b>				<b>Other classes</b>
Lectures: 5 hours weekly	Practice:	Other forms of classes: <i>(for example: mentoring system)</i>	Independent work:	
<b>Teaching methods</b>				
Lectures, semester papers, searching database in the field of current research.				
<b>Examination methods ( maximum 100 points)</b>				
<b>Exam prerequisites</b>	<b>No. of points:</b>	<b>Final exam</b>	<b>No. of points:</b>	
Student's activity during lectures	<b>10</b>	oral examination	<b>50</b>	
practical classes/tests		written examination		
Seminars/homework	<b>40</b>	.....		
Project				
Other				
<b>Grading system</b>				
<b>Grade</b>	<b>No. of points</b>	<b>Description</b>		
<b>10</b>	<b>100-91</b>	Excellent		
<b>9</b>	<b>90-81</b>	Exceptionally good		
<b>8</b>	<b>80-71</b>	Very good		
<b>7</b>	<b>70-61</b>	Good		
<b>6</b>	<b>60-51</b>	Passing		
<b>5</b>	<b>under 50</b>	Failing		