

<b>Study Programme:</b> All
<b>Course Unit Title:</b> Selected Instrumental Methods of Analysis
<b>Course Unit Code:</b>
<b>Name of Lecturer(s):</b> Professor Jaroslava Švarc-Gajić, Professor Snežana Kravić, Associate Professor Zorica Stojanović
<b>Type and Level of Studies:</b> Doctoral Degree
<b>Course Status (compulsory/elective):</b> Elective
<b>Semester (winter/summer):</b> Winter/Summer
<b>Language of instruction:</b> English
<b>Mode of course unit delivery (face-to-face/distance learning):</b> Face-to-face
<b>Number of ECTS Allocated:</b> 10
<b>Prerequisites:</b> /
<p><b>Course Aims:</b></p> <p>The course aim is to upgrade the knowledge and improve the skills related to instrumental methods of analysis and their application in quality control of food, pharmaceutical, biological and environmental samples. Practical experience in the application of instrumental methods of analysis. Training for the independent application of qualitative and quantitative analysis by using separation methods, electroanalytical and optical methods, together with appropriate sample preparation procedure.</p>
<p><b>Learning Outcomes:</b></p> <p>In addition to acquired academic knowledge, the PhD student should acquire the ability to independently plan and perform analytical experiments in order to determine the traces of various analytes in different samples (food and pharmaceutical products, environmental samples, etc.).</p>
<p><b>Syllabus:</b></p> <p><i>Theory</i></p> <p>The principles, types, and applications of separation methods, electroanalytical and optical methods of analysis. Theory and application of gas capillary chromatography. Capillary columns for gas chromatography (GC). Detectors in GC. Optimization of experimental factors for GC. Theory and application of liquid chromatography. High-performance liquid chromatography (HPLC). Instrumentation for HPLC. Detectors in HPLC. Optimization of experimental factors for HPLC analysis. Electrophoresis, theory, and application of capillary electrophoresis. Optimisation of experimental parameters of capillary electrophoresis. Detectors in capillary electrophoresis. Theory and application of modern optical methods of analysis (FTIR, NIR, NIT, ICP, ICP-MS, ESR, NMR, and fluorescence methods). Theory and application of diffusive electroanalytical techniques: chronopotentiometry, chronoamperometry, polarography, and voltammetry. Potentiometry. Electrochemical stripping analysis. Microcoulometry. Conductometry and high-frequency conductometry. Electrode systems, experimental factors, analytical indicators, and quantitative methods of analysis in the case of application of certain electroanalytical technique.</p> <p><i>Practice</i></p> <p>Literature survey about the latest findings in the field of a modern instrumental method of analysis. Application of various instrumental methods of analysis for different purposes.</p>

**Required Reading:**

1. K.J.Hyver: High Resolution Gas Chromatography, 3rd ed., Hewlett-Packard 1989
2. Barbara H. Stuart: Infrared spectroscopy: fundamentals and applications, Wiley, 2004.
3. Wang, J.: Analytical Electrochemistry, 2nd ed., Wiley-VCH, 2000.
4. Corradini, D.: Handbook of HPLC, CRC Press, 2011.

**Weekly Contact Hours:****Lectures:** 4**Practical work:** 2**Teaching Methods:**

Lectures and students group work.

**Knowledge Assessment (maximum of 100 points):**

<b>Pre-exam obligations</b>	points	<b>Final exam</b>	points
Active class participation	10	written exam	
Practical work		oral exam	40
Preliminary exam(s)	50		
Seminar(s)			

The methods of knowledge assessment may differ; the table presents only some of the options: written exam, oral exam, project presentation, seminars, etc.