

<b>Course code</b>	<b>MK101</b>		
<b>Course title</b>	<b>INSTRUMENTAL METHODS OF CHEMICAL ANALYSIS</b>		
<b>General information</b>			
Study programme	Graduate study „Medical chemistry“	Academic year	
Lecturer	Prof. Dr. Sc. Dražen Vikić-Topić		
Status	<b>Required</b>	Elective	
ECTS system			<b>9</b>
<b>Course objectives</b>			
Gaining fundamental knowledge about principles and potentials of contemporary instrumental methods of chemical analysis.			
<b>Course description</b>			
<ul style="list-style-type: none"> <li>- Chromatographic methods in medicinal chemistry: introductory to chromatography and stereochemistry, stereoselective separation techniques, overview of chiral chromatographic methods with drug enantioseparation examples.</li> <li>- Chiroptical methods in organic chemistry: circular dichroism (CD), vibrational circular dichroism (VCD), fluorescence-detected circular dichroism (FD CD), optical rotatory dispersion (ORD), polarimetry, and their application in determination of stereochemical properties of organic molecules (drugs, natural compounds, biomolecules).</li> <li>- UV/Vis, CD and fluorimetric spectrophotometry: fundamentals and practical work in the laboratory.</li> <li>- Atomic absorption spectroscopy (AA or AAS): the physical background of method, system for AAS (light source, atomizer, light separation and detection), single-beam and double-beam optical system, advantages and limitations, interpretation of results.</li> <li>- Mass spectrometry methods: introduction and principles, instrumentation, separation methods combined with mass spectrometry, qualitative and quantitative measurements, application in pharmacology and medicine.</li> <li>- Vibrational spectroscopy: electromagnetic radiation and its interaction with molecules, infrared (IR) and Raman spectroscopy, characteristic vibrations, principles and types of laser devices, laser applications in spectroscopy and medicine.</li> <li>- X-ray diffraction methods: introduction to methods, crystallisation methods, crystal structure solving and refinement methods for biologically important molecules and macromolecules, application in pharmacology and medicine.</li> <li>- Electron spin resonance (ESR): the basic definition and manipulation with spin states, the basic principles of ESR spectroscopy and applications on detection of various paramagnetic centres, application of spin probes and spin traps in medical diagnostics.</li> <li>- Processing the data obtained by several methods to get information about molecular structure of studied compounds and their chemical properties in the biologically relevant conditions.</li> </ul>			
<b>Learning outcomes</b>			
<p>Introduction to a wide range of instrumental methods used in medicinal chemistry research. Besides an immediate laboratory experience gained by working in laboratories that routinely use these methods in their scientific research, students will gain direct insight into a range of research themes and activities of practicing spectroscopists.</p> <p>A1, A2, A3, A5, B2, B5, C1, C2, C4</p>			