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|  **UNIVERSITY OF NIŠ** |
| **Course Unit Descriptor** | **Faculty of Medicine**  |  |
| **GENERAL INFORMATION** |
| Study program  | Integrated academic studies of **PHARMACY** |
| Study Module (if applicable) | - |
| Course title | Instrumental methods of chemical analysis |
| Level of study | [ ] Bachelor [x]  Master’s [ ]  Doctoral |
| Type of course | [x]  Obligatory [ ]  Elective |
| Semester | [x]  Autumn [ ] Spring |
| Year of study | II |
| Number of ECTS allocated | 6 |
| Name of lecturer/lecturers | Prof. dr Žarko Mitić (head), Prof. dr Goran NikolićAssist. dr Aleksandar Veselinović |
| Teaching mode |  [x] Lectures [ ] Group tutorials [ ]  Individual tutorials [x] Laboratory work [ ]  Project work [x]  Seminar [ ] Distance learning [ ]  Blended learning [x]  Other |
| **PURPOSE AND OVERVIEW** |
| * Introducingstudents with theoretical principles and procedures of carrying out the analysis by using different instrumental methods of chemical analysis.
* Possibilities and purpose of application of certain instrumental methods for different types of samples.
* Practical work on different devices and individual carrying out of analyses with particular instrumental methods.
* Student is capable to independently choose a particular instrumental method for specific analysis according to type and characteristics of sample to be analyzed.
* Student is capable to independently interpret obtained results by using spectroscopic instrumental methods of chemical analysis, assisted by appropriate literature.
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| **SYLLABUS** |
| **THEORY.** Spectroscopic methods of instrumental analysis. Theoretical basics of spectroscopic methods of instrumental analysis. Atomic spectroscopy (Flame photometry, ICP, Atomic absorption spectrometry (AAS), Spectroscopy of characteristic X-rays). Molecular spectroscopy (UV-Vis spectrophotometry. Luminescent spectroscopy. Analytical applications of fluorescence, phosphorescence, and chemiluminescence. IR spectroscopy. Raman spectroscopy. Magnetic resonance spectroscopic methods (NMR and ESR). Mass spectrometry (MS)).Non-spectroscopic optical instrumental methods (Light scattering and instrumental methods of chemical analysis based on light scattering. Refraction of light and instrumental methods of chemical analysis based on the refraction of light. Optical activity and instrumental methods of chemical analysis based on optical activity).Electrochemical methods of instrumental analysis Theoretical basics of electrochemical methods of chemical analysis. Conductometry and conductometric titrations. Galvanic cell, Nernst's equation of the electrode potential. Potentiometry and potentiometric titrations. Electrolysis; Faraday’s law. Electrogravimetry and coulometry. Voltammetry. Polarography.Thermal instrumental methods. Thermogravimetry (TG). Differential thermal analysis (DTA). Differential scanning calorimetry (DSC).Separation methods. Physicochemical principles of separation. Chromatographic methods (Thin-layer chromatography (TLC). Gas chromatography (GC). Liquid chromatography (LC). High performance liquid chromatography (HPLC)). Electrophoresis.**PRACTICE.** Spectrophotometry in UV-Vis region, Recording of Vis spectrum of the colored solution. Determination of the solution concentrations by spectrophotometry (calibration curve method). Refractometric determination of the solution concentration. Polarimetric determination of the solution concentration. Neutralization and precipitation conductometric titrations. Neutralization potentiometric titration of monoprotic and poliprotic acids. UV-Vis, IR, NMR and MS spectra analysis of the organic compounds, Examples. The use of MALDI-TOF MS in the analysis of proteins and polypeptides. |
| **LANGUAGE OF INSTRUCTION** |
| [x] Serbian (complete course) [x]  English (complete course) [ ]  Other \_\_\_\_\_\_\_\_\_\_\_\_\_ (complete course)[ ] Serbian with English mentoring [ ] Serbian with other mentoring \_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| **ASSESSMENT METHODS AND CRITERIA** |
| **Pre exam duties** | **Points** | **Final exam** | **Points** |
| **Activity during lectures** | **5** | **Written examination** | **20** |
| **Practical teaching** | **15** | **Oral examination/Test** | **60** |
| **Teaching colloquia** | **2×30=60** | **OVERALL SUM** | **100** |
| **\*Final examination mark is formed in accordance with the Institutional documents** |