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| **Study program** Master Studies Chemistry | | | | |
| **Course title** Physical-chemical principles of instrumental analysis (H202C) | | | | |
| **Name of lecturer/lecturers** Vesna P. Stankov Jovanović | | | | |
| **Type of course** Obligatory | | | | |
| **Number of ECTS allocated** 6 | | | | |
| **Course objectives**  Acquiring knowledge about the physical-chemical principles of the most important modern optical and electroanalytical methods of analysis, familiarization with the principles of functioning of instruments and  analytical signals that are measured and used in qualitative/quantitative analysis. | | | | |
| **Course outcomes**  Having finished this course successfully, student will be able to:  - define and analyze physical-chemical processes that are used as a basis for instrumental methods  - apply and relate physical-chemical principles with the construction of instruments for obtaining an analytical signal  - describe and compare the construction of apparatus that apply in instrumental analysis  - analyze the relationship between physical and chemical characteristics and the analytical signal  -differentiates phenomena and methods used for qualitative and quantitative analysis. | | | | |
| **SYLLABUS**  *Lectures*  Electromagnetic radiation and optical methods of analysis. The principle of Raman spectroscopy. The principle  of nuclear magnetic resonance. Principle of electron spin resonance. Principles of x-ray diffraction. Principles of photoelectron spectroscopy. Principles of electron microscopy. Principles of mass spectrometry. Principles of induced coupled plasma spectroscopy with emission optical detection and mass detection. Principle of atomic fluorescence. The principle of X-ray fluorescence. The principle of molecular fluorescence and phosphorescence. The principle of chemiluminescence. Partition of electroanalytical methods of analysis. Types of electrodes and electrode processes. Membrane and ion-selective electrodes-construction. Principles of potentiometric titrations. Principles of potentiometric sensors and biosensors. Processes on dropping mercury electorde and other types of mercury electrodes. Principles of modern polarographic methods. Principles of voltammetry. Principles of amperometry and biamperometry. Principles of chronopotentiometry and chronoamperometry. Principle of oscillometry.  *Laboratory work*  Exercises in certain areas that are included in theoretical teaching. | | | | |
| **References**  1.D.A Skoog, D.M West, F.J Holler, Principles of Instrumental Analysis, Saunders College Publishing,  Thomson Learning, 1998.  2. DA Skoog, DM West, FJ Holler, Osnove analitičke hemije, Školska knjiga, Zagreb, 1999.)  3. F. Rouessac, A. Rouessac, Chemical Analysis, Modern Instrumental Methods and Techniques, John Wiley &  Sons, Chichester, 2000.  4. S. Mitić, Elektroanalitička hemija, PMF, Niš, 2008  5. S. Mentus, Elektrohemija, Faculty of Physical Chemistry, Belgrade, 1996.  6. A.J. Bard, L.R. Faulkner, Electrochemical Methods, Fundamentals and Applications, Wiley, 2001  7. J. Barker, Mass spectrometry: analytical chemistry by open learning. 2nd ed.. Chichester [etc.], 1999.  8. J.T. Watson, Introduction to mass spectrometry. 3rd ed.. Philadelphia; New York, 1997.  9. I. Stojković Simatović, Elektohemija:teorijske osnove i primena, Belgrade 2018. | | | | |
| **Active teaching classes** | **Lectures** 45 | | **Laboratory work** 30 | |
| **Teaching mode**  Lectures, demonstration, simulation, seminars. | | | | |
| **ASSESSMENT METHODS AND CRITERIA (Max 100 points)** | | | | |
| **Pre exam duties** | **Points** | **Final exam** | | **Points** |
| Activity during lectures | 5 | Written examination | | 35 |
| Practical teaching | 10 | Oral examination | | - |
| Teaching colloquia | 40 |  | |  |
| Seminar | 10 |  | |  |