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| **Study program** Chemistry |
| **Course title** Analytical chemistry 1 |
| **Name of lecturer/lecturers** Violeta D. Mitić |
| **Type of course** Obligatory |
| **Number of ECTS allocated** 8 |
| **Course objectives**Acquiring basic knowledge of qualitative chemical analysis and equilibrium processes in homogeneous and heterogeneous systems. |
| **Course outcomes**Based on the acquired knowledge and understanding of basic facts, concepts, principles and theories, the student will be able to identify unknown cations and anions in the sample by applying the appropriate ones laboratory procedures in solving given practical problems in qualitative analysis. |
| **SYLLABUS***Lectures*Subject, development and importance of analytical chemistry. Solutions. Chemical equilibrium. Law of mass action. Activity and activity coefficient. Acid-base equilibria. Protolithic theory of acid and base. Ionic product of water and pH value. Solvent effects on acid-base strength. pH of strong acid, pH of weak acids. pH of strong base, pH of weak base. pH of mixture of strong acid and weak monoprotic acid. pH of mixture of two weak monoprotic acids Polyprotic acids. pH of mixture of two weak bases. Graphical representation of acid/base speciation. pH of a salt solution. Buffers. Acid-base indicators. Complex formation equilibrium/equilibrium constant. Distribution diagrams. Metal ion equilibrium concentrations in complex solutions. The role of complex compounds in analytical chemistry. Solubility and solubility product. Factors that affect solubility: ionic forces, common-ion effect, pH effects, influence of complexing agents. Conditional solubility product. Fractional precipitation: carbonate, hydroxide, sulfide and chloride. Oxidation and reduction. Predicting the direction of redox reactions. Equilibrium potentials of solutions containing several redox couples. Formal electrode potential. Classification of cations and anions. Systematic analysis of complex samples.*Laboratory work*Qualitative analysis of anions. Qualitative analysis of group V and IV cations. Qualitative analysis of group III cations. Qualitative analysis of group II and I cations. Qualitative analysis of cations and anions.  |
| **References**J. Savić, M. Savić, Osnovi analitičke hemije, Svetlost, Sarajevo, 1981.R. Igov, Analitička hemija – teorijski osnovi, Niš, 1997.S. Mitić, I. Rašić Mišić, R. Micić, M. Dimitrijević, Semimikro kvalitativna hemijska analiza, PMF Niš, 2017D.A. Skoog, D.M. West, F.J. Holer, Foundamentals of Analytical Chemistry, Sounders College Publishing,New York, 1996.Lj. V. Rajković, Analitička hemija –zbirka zadataka, TMF Beograd, 2005 |
| **Active teaching classes** | **Lectures** 60 | **Laboratory work** 60 |
| **Teaching mode** Lectures, laboratory work, consultations |
| **ASSESSMENT METHODS AND CRITERIA (Max 100 points)** |
| **Pre exam duties** | **Points** | **Final exam**  | **Points** |
| Activity during lectures | 6 | Written examination | 15 |
| Practical teaching | 25 | Oral examination | 30 |
| Teaching colloquia | 24 |  |  |
| Seminar |  |  |  |