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| **Study program** Chemistry |
| **Course title** Selected Chapters of Physical Chemistry (H218C) |
| **Name of lecturer/lecturers** Snežana B. Tošić |
| **Type of course** Elective |
| **Number of ECTS allocated**  6 |
| **Course objectives**Acquisition of additional knowledge to upgrade the existing one in the following areas: aggregate states of the matter, thermodynamics, phase balance, colloids and macromolecules, kinetics, and electrochemistry. Acquiring knowledge about the importance of and connection between physical chemistry and other sciences and scientific disciplines. Developing the ability to apply the acquired knowledge to concrete systems through the combination with acquired knowledge in physics and mathematics. |
| **Course outcomes**The student can: - interpret the characteristics and laws that apply to the four aggregate states,- apply the acquired knowledge of chemical thermodynamics to the concept of statistical thermodynamics,- apply the acquired knowledge of phase equilibrium to the monitoring and interpretation of more complex phase systems,- apply the acquired knowledge of the field of colloidally dispersed systems, macromolecules, and balance in complex formation reactions,- interpret the principles and balances in chemical kinetics and electrochemistry from a thermodynamic point of view,- apply the acquired knowledge of physical chemistry to problems in other sciences and scientific fields. |
| **SYLLABUS***Lectures*Selected chapters from the area of ​​the aggregate state of matter: gaseous state of matter, liquid state of matter, glassy state, liquid crystals, solid state of matter, gas plasma state. Fundamentals and application of statistical thermodynamics. Connection between classical and statistical thermodynamics. Phase equilibrium - selected examples of one-component, two-component, and three-component systems. Electrokinetic and optical properties of colloidal systems. Physical-chemical properties of macromolecules. Examples of reaction mechanisms (polymerization reactions, photochemical reactions). Basics of kinetic methods of analysis. Basics of equilibria in complex formation reactions. Chemical thermodynamics and kinetics. Chemical thermodynamics and electrochemistry. Application of physical chemistry in other sciences and scientific disciplines (biology, biochemistry, environmental chemistry, technology, material chemistry, astrophysics, medicine).*Laboratory work*Determination of the composition of the complex by different spectrophotometric methods. Determination of the equilibrium constant of the complex formation reaction spectrophotometrically. Determination of the thermodynamic parameters of the complex formation reactions. Determination of the rate constant, partial orders, and total order of the reaction spectrophotometrically. Determination of thermodynamic parameters of the reaction based on kinetic-spectrophotometric measurements. |
| **References**1. Dragica Minić, Ankica Antić-Jovanović, Fizička hemija, Faculty of Physical Chemistry, Belgrade, 2005.2. Mirjana Obradović, Dragan Veselinović, Predrag Đurđević, Fizičko-hemijske metode ispitivanja ravnoteža u kompleksirajućim sredinama, University of Niš, University of Belgrade, 1996.3. Gordon M. Barrow, Physical Chemistry, The McGraw-Hill Companies, Inc., 1996.4. Engel Thomas, Physical Chemistry, Prentice Hall, Boston, 2010.5. Nadežda Petranović, Hemijska Termodinamika, Faculty of Physical Chemistry, Belgrade, 1992. |
| **Active teaching classes** | **Lectures** 45 | **Laboratory work** 15 |
| **Teaching mode**Lectures, interactive teaching, seminars, consultations. |
| **ASSESSMENT METHODS AND CRITERIA (Max 100 points)** |
| **Pre exam duties** | **Points** | **Final exam**  | **Points** |
| Activity durung lectures | 5 | Written examination | - |
| Practical teaching | 15 | Oral examination | 30 |
| Teaching colloquia | 40 |  |  |
| Seminar | 10 |  |  |