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| ***Title of the course:***  **Chemistry I.** | | ***NEPTUN-code:***  RMXCA1KBNF | ***Weekly teaching hours:*** *l+cw+lw*  2+0+2 | ***Credit*:** 4  ***Exam type****:* e |
| ***Course leader:***  Csiszér Tamás Ph.D.  **Lecturer:** Dr. Mészárosné Dr. habil. Bálint Ágnes | | ***Position:***  associate professor | ***Required preliminary knowledge:***  - | |
| ***Curriculum:*** | | | | |
| The goal of the subject is to acquire the essential knowledge of the structure, properties, and transformations of chemical substances. The subject discusses the characteristics and reactions of the substances through the formation of unique atomic and molecular structures through chemical bonds and interactions to characterise homogeneous and heterogeneous sets. It also describes the grouping, production, and, most importantly, applications of elements and inorganic compounds with students. In practice, students practice solving the most important computational tasks in the field of inorganic chemistry (writing and sorting reaction equations based on oxidation numbers, stoichiometry, concentration of solutions concentration, conversion of concentration units, and gas laws). | | | | |
| ***Curriculum Description:*** | | | | |
| **week** | **Topics of lectures and practices** | | | |
| 1. | **Lecture:** Opening of the year  **Practice:** Basics of laboratory work (safety rules). Calculations. Preparation of solution (2 points). | | | |
| 2. | **Lecture:** A brief history of chemistry. Structure of the atom. | | | |
| 3. | **Lecture**: Atomic models. Radioactivity. Quantum mechanical atomic description.  **Practice:** Test 1. (Calculation of concentration). (5 point)  Volumetric analysis, acid-base titration (3\*2 points) | | | |
| 4. | **Lecture:** Periodic table theory. | | | |
| 5. | **Lecture:** Types of covalent bonding. The transition between bond types. The quantum mechanical molecular model.  **Practice:** Absorption spectrometry: determination of phosphorus concentration by spectrophotometry (2 points); | | | |
| 6. | **Lecture:** Classification of material systems; SI system of units. Properties of gases. Concentration of solutions. Properties of dilute solutions. | | | |
| 7. | **Lecture:** Types of colloidal systems, their production, and changes.  **Practice:** Holiday | | | |
| 8. | **Lecture:** Basics of chemical thermodynamics. Main terms.  Basics of reaction kinetics. Law of mass action, chemical equilibria. | | | |
| 9. | **Lecture:** Electrolyte equilibria. Buffers.  **Practice:** Test 2. (pH calculations). (5 points)  Absorption spectrometry: determination of nitrite concentration by spectrophotometry (2 points) | | | |
| 10. | **Lecture:** Interpretation and quantitative relationships of chemical reactions. Acid-base theories. | | | |
| 11. | Rector’s holiday | | | |
| 12. | **Lecture:** Electrochemistry, conductivity and dissociation, electrode potential. Galvanic elements. Corrosion and corrosion protection. | | | |
| 13. | **Lecture:** Interpretation and quantitative relationships of chemical reactions. Acid-base theories. Inorganic Chemistry 1.  **Practice:** Test 3(calculation- electrochemistry). (5 points).  Measurement of pH (2 points). pH-potentiometry. (2 points) | | | |
| 14. | **Lecture:** Inorganic Chemistry 2. | | | |
| ***Mid-term requirements:*** | | | | |
| *Participation in occupations:*  Attendance is ***compulsory.*** **Lectures + laboratory work (measurements and written tests).**  The weekly schedule is shown above, and practice and lecture times are according to schedule.  It is compulsory to attend lectures and laboratory exercises. Up to 30% of lectures may be missed, but not laboratory exercises.  Both tasks and class participation are mandatory. Achieving the two specified minimums is a condition for getting a sign and a note. | | | | |
| *Midterms, protocols, reports, etc.:*  1) During the laboratory practice, short calculation tests will be written (worth up to 5 points) (total of 15 points)  2) Laboratory measurements are worth up to 2 points each (total of 20 points).  The written exercises and submitted laboratory protocols must fulfil a minimum of 18 points.  3) Exam: The theoretical and calculation classroom test will be during the examination period. (Up to 65 points can be achieved - minimum.: 33 points)  The minimum is 51 points. | | | | |
| *The method of obtaining a signature/exam mark:*  For those who fail the midterm, a make-up test will be given at an agreed time.  If you fail the end-of-year mark, the exam will be held on the date announced in the first week of the examination period. Both exams can be made up at the end of the year.  Below 51 points: unsatisfactory; 51-61 points: satisfactory; 62-75 points: intermediate; 76-85 points: good; 86 points and above: Excellent  Anyone who has not reached the minimum of 51 points and does not fulfil the minimum points' requirements has an insufficient grade. If the note is unsuccessful, the provisions of Section 17 (6) of the TVSZ can be replenished. | | | | |
| ***Professional competencies:*** | | | | |
| * Knowledge of general and specific mathematical, natural, and social scientific principles, rules, relations, and procedures as required to pursue activities in the special field of environment protection. * Comprehensive knowledge of the basic features and interrelations of environmental elements and systems and the environmentally harmful substances affecting them. * Knowledge of the main methods to examine the quantity and quality features of environmental elements and systems, their typical measuring instruments, and limitations thereof, and methods for evaluating data measured. * Able to perform basic tests of the quantity and quality characteristics of environmental elements and systems using state-of-the-art measuring instruments; draw up and implement measurement plans; and evaluate data. * Able to solve tasks of water, soil, air, radiation, and noise protection, as well as waste treatment and processing at the proposal level; to participate in preparing decisions; to perform authority audits; and to take part in the operation of these technologies. * Able to reveal deficiencies in the technologies applied, process risks, and initiate mitigation measures after becoming familiarised with the technology concerned. | | | | |
| ***Literature:*** | | | | |
| 1. A. Pahari, B. Chauhan: Engineering Chemistry, Infinity Science Press LLC, Hinghan, Massachusetts, New Delhi, India, 2007 2. Darrell Ebbing,‎ Steven D. Gammon: General Chemistry, Cengage Learning, 2015, Cengage Learning, Boston, ISBN-13: 978-1305580343; ISBN-10: 1305580346 3. Peter G. Nelson: Introduction to Inorganic Chemistry, Key ideas, and their experimental basis, 2018, 3 editions, Pages: 177, ISBN: 978-87-403-1912-5 | | | | |