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| **Title and Code** of the subject:  **General and Inorganic Chemistry MTB7006A** | **ECTS Credit Points: 4** |
| **Type** of the subject: **compulsory** | |
| **Ratio of theory and practice** (credit%) 70 % theoretical, 30 % practical | |
| **Type and number of classes per semester**: 28 hours lecture and 14 hours practice per **semester**  Number of teaching hours per week : 2+1 (lecture and practice) | |
| **Type of exam**: **colloquium** | |
| **Subject in the curriculum**: **1st semester.** | |
| **Preliminary requirements:****none** | |

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| **Summary of content - theory**: |
| Course objectives:  Acquisition of the chemical bases of the processes that determine the production and quality assurance of foods and raw materials, their scientific foundation, and the understanding of the chemical bases. Developing skills to accommodate new knowledge.  Education of selected general and inorganic chemical knowledge, grounding of chemical studies, and the foundation of related primer and subject areas.  **Schedule:**  1st week: The subject of chemistry. Material and structure. Material and appearance forms, their quantitative relationships. The financial systems and their grouping possibilities. Elemental particles forming the atom. Structure of the nucleus. Atomic models. The basics of spectroscopy. X-radiation.  2nd week: Quantum numbers, track energy, order of filling of the atomic orbitals, Pauli principle and Hund rule. Periodic Table. Atomic body, valence shell. Ionization energy, electron affinity, electronegativity. The size of atoms and ions and their change in the periodic system.  3rd week: Structure of molecules. Primary chemical bond types, binding energy and binding distance. Secondary chemical binding forces and their significance.  4th week: Geometry and polarity of molecules. Compound ions, binding order. Dative binding. Complexes, chelates: their stability and significance in food sciences. Clatrates and their use in food quality control.  5th week:Solid state. Crystal grid types and errors. Solutions, solubility. Hydration heat, dissolving heat. Liquid state, surface tension, critical parameters, liquid crystals. Vapor tension. Gaseous state, ideal and realistic gases, gas laws.  6th week: Multi-component material systems. Mixtures, solutions, solubility, electrolytes. Methods of expressing the concentration of solutions. Dilute solutions and their properties: colligative properties and their relationships.  7th week: Reaction kinetics. The direction, time course of the chemical processes, factors affecting the speed of the reactions. Catalysis, catalysts, biocatalysts. Catalyst inhibitors, negative catalysis.  8th week: Protolytic processes. Major acid-base theories. Reversible reactions, Law of mass effect. Le Chatelier-Braun principle. Dissociation of weak acids and bases. Degree of dissociation, dissociation constant and their quantitative correlations.  9th week: Auto-protolytic process of water, definition and interpretation of pH. Importance of pH value in biological organisms. Hydrolysis of salts, food and environmental significance. Acid-base indicators, buffers.  10th week: Electrochemistry. Oxidation number and its calculation. Electrolysis, Faraday's laws. Electrode, normal and standard potential. Hydrogen electrode. Galvanic elements, batteries. Redox systems, redox potential and their role in foods. Local elements and their use in corrosion protection.  11th week: Colloidal systems, the specific surface of colloids. Production and grouping of colloids, properties of colloidal solutions. Eu-colloids. Absorption phenomena. Stability of colloids. Gels and their biological and food industry significance.  12th week: Distribution of chemical elements by frequency and property. *Non-metallic elements*: Hydrogen. Halogen elements and their compounds. Elements of the oxygen group. Oxygen and its compounds. Sulfur and its compounds, their significance in the production and quality of plant origin food raw materials.  13th week: Elements of a nitrogen group. Nitrogen and its compounds. Phosphorus and its compounds. Elements of carbon group. Allotropy phenomenon. Carbon and its inorganic compounds.  14th week: Silicates and their significance in the soils. Boron and its compounds. *Metallic elements*: alkali metals, alkaline earth metals and their compounds. Water hardness, elimination of water hardness, their importance in the production and quality of food. Natural waters. |
| **Summary of content - practice**: |
| Skills to be learnt:  To learn how to work in a chemistry laboratory, knowing the basic equipment’s handling. Deepening the theoretical knowledge by solving some practical exercises. To get adequate skills of concentration calculation. Basic knowledge on the acid-base titrations and the calculation of their results.  **Schedule:**  1st week: Safety regulations in the chemistry laboratory. Basic laboratory techniques. Chemical formula of ionic compounds.  2nd week: Chemical and physical properties of some common and in the agricultural production important inorganic compounds  3rd week: Concentration units used for describing of the solutions. Calculations of chemical concentrations, part 1.  4th week: Calculations of chemical concentrations, part 2.  5th week: Deeping and better understanding of pH value and its importance in the living organisms. Measurement and calculation of pH values of different test solutions. Demonstration of salt hydrolysis.  6th week: Acid-base titrations and the calculation of their results.  7th week: Summarising of practices and writing the final test. |
| ***Compulsory literature:***  Ebbing, D. D. – Gammon, S.D. (2009): General Chemistry. Houghton Mifflin Co. Boston – New York. ISBN 978-0-618-93469-0  Beran, J. A. - Brady, J. E.: Laboratory Manual for General Chemistry. John Wiley and Sons, 1990  ***Optional literature:***  Chang, R. (2008): General Chemistry. McGraw-Hill Publishing, New York, NY. ISBN: 978-0-07-304851-2  Riedel, E. – Meyer, H.-J. (2013): Allgemeine und anorganische Chemie. 11. Auflage. Walter de Gruyter, Berlin. ISBN 978-3-11-026919-2 |
| **Competencies gained** *(acc. to the Regulation on training and outcome requirements)* |
| 1. **Knowledge**   Students learn about the general and specific characteristics of chemistry, their boundaries, their directions of development, and their attachment to related subjects. Students know the usability of basic chemistry in their own profession.   1. **Ability**   Chemistry theories and related terminologies can be used in innovative ways to solve actual problems.   1. **Attitude:**   She/he has a strong professional identity and professionalism that she/he can take for professional and wider social community.   1. **Autonomy and responsibility:**   Students see the importance of general and inorganic chemical knowledge so that he/she can formally incorporate chemical studies and related primer and subject matter into further studies by the end of their studies. Students will be able to autonomously and responsibly use the knowledge acquired in the course of their work in a deliberate manner. |

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| **Responsible lecturer:**  **Assoc. Professor Dr. habil. Imre Vágó, CSc, deputy head of Institute** |
| **Other lecturer:**  **Assist. Professor Erdeiné dr. Kremper Rita, PhD** |
| **Form of examination:**  **Oral and/or written** (only if the practice is signed) |
| **Requirement(s) to get signature:**  There are “General and Inorganic laboratory practices” every second week (2 hrs). On every practice there will be a written test on the previous lesson or homework. There are 8 parts of the 6 tests. The semester can be accepted if the student completes 7 parts of the 8. Attendance is compulsory, no more than two (2) missing can be accepted during the semester (the missed tests can be repeated at the end of the semester). There will be no mark at the end of semester. The bi-weekly tests of the practice will be accepted if the exercises are solved at a minimum level of 60 percentage. |