**Subject:** Inorganic chemistry I

**Lecturer:** Dr.sc. Ilir Shehu

**Course status**: obligatory

**ECTS:** 7

**Course description:** In these lectures will be addressed: Groups of elements of the periodic table, the general characteristics within the groups, electronic configurations of the elements, in particular, ionization energy, electronegativity, characteristics of the redox potential, the natural compounds, industrial and laboratory benefit and use them, connections between them, etc.

**The aim of the course:** Chemistry as fundamental science is a function of many scientific disciplines and as such, includes all pores of life. Chemical elements enter into the composition of all living matter (organic) and non-living matter (inorganic). Therefore, students in this course have the opportunity to familiarize themselves with the detailed study of the system of chemical elements, focusing on each group of the periodic system. At the beginning of each group will get to know in detail the elements and characteristics of that group, based on the electronic configuration of the ionic radius, covalent radius, ionization energy, energy of the connectivity, electronegativity and redox potential. In particular for each element is important to gain knowledge on nomenclature, the state of nature, the main ores, how to benefit in the laboratory and the principles of profitability in the industry.

**Learning expectations:** After completion of this course, the students will:

* To know in detail the chemical elements, their ores and distribution in nature.
* Understand the various chemical processes and describe their development.
* To describe the crystal structures of elements and compounds and their molecular structures.
* To describe the electronic configurations of atoms of the chemical elements.
* To describe the physical and chemical properties of the elements and their compounds.
* To know how to access laboratory and industrial benefit principles of elements and their natural compounds.

**Teaching methodology:** lectures, discussions, consulting, laboratory exercises and seminars.

**Evaluation methods:** First evaluation 25%; second evaluation 25%; regular presence5%, engaging in exercises 15%, final exam 30%.

**Concretization accessories:** projectors, tables, pencils, images, videos etc.

**The ratio between the theoretical and practical part of this course is: 3:3**

**Basic Literature:**

1. 7. I.Filipovic. S. Lipanovc,Opca i Anorganska Kemija (I, II ) Skolska Knjiga Zagreb, 1987. i përkthyer në gjuhën shqipe, 1997)
2. 8. M.F.Prifti, Kimia inorganike.Shtëpia botuese e librit universitar.Tiran,1999
3. 9. F.A.Catton,G.Wilkinson.Advanced inorganic chemistry, 5th Edition,J.Wiley,New Jork1988
4. 10. E.Kahrovic,Anorganska hemija, Universitetska knjiga, Sarajevo,2005
5. 11. Mortimer, Charles E, “Chemistry Fifth Edition”, (Vëllimi I -1), 2000, përkthim në shqip nga Eduard Andoni, Tiranë
6. 12. Ulrich Müller. Inorganic Structural Chemistry, Edition 2 , 2006, USA

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| **Contribution on student load (must correspond with learning outcomes)** | | | |
| **Activity** | **Hours** | **week** | **Total /hours** |
| Lectures | 3 | 15 | 45 |
| Exercise theoretical/laboratory | 3 | 15 | 45 |
| Practical work |  |  |  |
| Consultations | 2 | 5 | 10 |
| Field excercises |  |  |  |
| Mid-terms, seminars | 1 | 5 | 5 |
| Homework | 1 | 5 | 5 |
| Individual time spent studying (library or home) | 3 | 15 | 45 |
| Final exam preparation | 5 | 3 | 15 |
| Time spent in evaluation (tests, quizzes, final exams) | 2 | 2 | 4 |
| Projests,presentation, etc. | 2 | 2 | 4 |
| **Totali** |  |  | **178** |

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| **Designed study plan:** | |
| **Week** | **Lectures which will be held** |
| ***First week:*** | Information of the curriculum of the course and literature  General characteristics of the elements s and p. |
| ***Second week:*** | Hydrogen, isotopes of hydrogen, hydrogen ortho and para.  Compounds with varying degrees of oxidation (-1) and (+1).  Oxygen. Ozone. Oxygen compounds with degrees of oxidation (-2) and (-1). Water hardness, the treatment of water for use in industry and for drinks. Peroxide, H2O2.  0 group elements (the noble gases). Group 18 general characteristics of the group. Helium, Neon, Argon, Krypton. Xenon |
| ***Third week:*** | Elements of Group 17 (VIIB) (halogen elements)      General properties of the group    Fluoride, hydro flour (Benefit, virtues, the use)    Chlorine, hydrochloric acid, salts (benefit, the properties, the use)  Chlorine compounds with varying degrees of positive oxidation form: HXO, HXO2, HXO3, HXO4 and their salts. (profit either, properties, usage).    Bromine, bromine hydro acid and salts (benefits, features, use    Jodi, hydro iodide acid and salts. (Wealth, properties, usage). |
| ***Fourth week:*** | Elements of Group 16 (VIB). General properties of sulfur group, allotropic modifications (profit either, properties, usage).  Sulfuric compounds, oxidation scale of (-2) - (+6). - H2S, halogenated: SX2, SX6.  Sulfur oxides SO n (n = 1.2.3) and S2O2 n + 1 (n = 0, 1, 3).     H2SOn sulfur acids (n = 2, 3, 4, 5) and (n = 4, 5, 6, 7, 8).     Selenium, telluride and polonium, overview. |
| ***Fifth week:*** | Elements of the group 15 (VB). General properties of the group. Nitrogen, compounds with varying degrees of oxidation (-3) - (+5).  Ammonia and its salts. Hydrazine. Oxides of nitrogen, N2O, NO, N2O3, NO2, N2O5, with particular emphasis acids, nitric acid and cyanhydrik acid. |
| ***Sixth week:*** | Phosphorus, allotropic modifications. Compounds with hydrogen. phosphine  Phosphorus compounds with halide.  Oxides of phosphorus, acids and the corresponding salts.  Arsenic compounds with varying degrees of oxidation (-3) - (+5). Arsine.  Oxides, acids and the corresponding salts.  Antimony and bismuth, overview. |
| ***Seventh week:*** | Elements of Group 14 (IVB)  The total group settings.  Carbon, diamond, graphite. Hydrocarbons.  Oxides of carbon oxidation rate (+2) and (+4). acids  Acids and corresponding salts.  Silicon. Hydrides (Silane). Halogenated. Oxide (SiO2)    Silicon acids. Silicate, Silicone. |
| ***Eighth week:*** | Tin, tin compounds with varying degrees of oxidation  +4 Valens tin compounds.  Lead, benefits, features, the use.  Lead compounds +2 and +4 Valens.  Elements of Group 13 (IIIB)  The total group settings |
| ***Ninth week:*** | Bore hydrides (diborane), halide, oxides, acids and salts. Aluminum oxides, hydrides, chlorides, sulphates gallium, Indium and Thallium, overview.  The first intermediate Rating |
| ***Tenth week:*** | Elements of group 2 (IIA)  General properties of the group  Alkaline earth metals  Hydrides, oxides, hydroxides, chlorides, carbonates, sulphates and sulphide.  Elements of Group 1 (IA)  alkaline metals  General properties of the group  Lithium, Sodium, Potassium, will be highlighted more,  and for rubidium, cesium and francium, overview . |
| ***Eleventh week:*** | Transitional elements, of modifying the orbital’s d and f  The basic principles of profitability metals.  One group 11 elements (IB)  General properties of the group  Copper, the benefit properties, use.  Copper compounds one and two waves. Silver, profit either, properties, use  Gold generally a precious metal. |
| ***Twelfth week:*** | Elements of Group 12 (IIB)  General properties of the group.  Zinc, benefits, features, use.  Compounds.  Cadmium, benefits, uses, properties.  Compounds.  Mercury, the benefits, features, uses.  Compounds.  Elements of Group 8 (VIII)  Iron triad, general properties |
| ***Thirteenth week:*** | Iron, benefits, features, use.  Iron compounds two and three valence.  Complex compounds.  Cobalt and nickel, the benefit, the properties and use  Their compounds.  Platinum metals, overview. |
| ***Fourteenth week:*** | Group Elements 7 (VIIA)  Overheads group settings  Manganese, Technetium, rhenium  Group Elements 6 (VIA)  General properties of the group  Chromium oxides, hydroxides  Molybdenum, tungsten, overview. |
| ***Fifteenth week:*** | Complex compounds of Group 5 elements, elements of the group 4 (IVA).  Brief Overview  Elements of Group 3 (IIIA)  Brief overview. |

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| |  |  | | --- | --- | | **Designed study plan – Lab exercise:** | | | **Nr.** | **Lab exercises which will be held** | | ***1.*** | Laboratory Benefit of Hydrogen | | ***2.*** | Laboratory Benefit of Oxygen | | ***3.*** | Analysis of sulfur and its compounds | | ***4.*** | Analysis of chlorine and its compounds | | ***5.*** | Chemical analysis of bromine | | ***6.*** | Chemical analysis of Iodine | | ***7.*** | Chemical analysis of Nitrogen | | ***8.*** | Phosphorous Chemical analysis | | ***9.*** | Chemical analysis of the elements of group 14 of the periodic system | | ***10.*** | Chemical analysis of Boron | | ***11.*** | Chemical analysis of Alumina | | ***12.*** | Chemical analysis of metals alkaline- their compounds | | ***13*** | Chemical analysis of Manganese | | ***14*** | Chemical analysis of alkaline earth metals -their compounds | | ***15*** | Analysis of the calcined soda with ammonia method | |

**Academic policies and rules of conduct:**

* Keeping the peace in teaching
* Exclusion of mobile phones
* Entrance in hall at time.