**DESCRIPTION OF THE COURSE OF STUDY**

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| **Course Code:** |  | 0916.4.FAR.B/C.CHON |
| **Course Name:** | Polish : | **Chemia ogólna i nieorganiczna** |
| English: | ***General and Inorganic Chemistry*** |

**1. USYTUOWANIE PRZEDMIOTU W SYSTEMIE STUDIÓW**

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| **1.1. Field of study** | **PHARMACY** |
| **1.2. Mode of study** | **Full-time** |
| **1.3. Level of study:** | **Integrated Master’s Degree** |
| **1.4. Profile of study** | Practical |
| **1.5. Person/s preparing the course description** | dr. hab. Joanna Masternak, prof. UJK; dr Beata Szczepanik, dr Anna Kołbus dr hab.Anna Adach prof.UJK |
| **1.6. Contact** | joanna.masternak@ujk.edu.pl; [beata.szczepanik@ujk.edu.pl](mailto:beata.szczepanik@ujk.edu.pl), anna.kolbus@ujk.edu.pl Anna.Adach@ujk.edu.pl |

# 2. GENERAL COURSE CHARACTERISTICS

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| **2.1. Language of instruction** | Polish |
| **2.2. Prerequisites** | knowledge of the basics of general and inorganic chemistry and the basics of chemical calculations at the level of requirements of the extended secondary school program |

**3. DETAILED COURSE CHARACTERISTICS**

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| **3.1. Form of classes** | | Lectures, Exercises, Laboratory Sessions |
| **3.2. Place of classes** | | Teaching facilities at UJK, |
| **3.3. Form of assessment** | | Examination  Graded credit |
| **3.4. Teaching methods** | | Lectures  didactic methods providing - informative lecture (conventional), problem-based lecture, multimedia presentation Laboratories didactic methods searching - laboratory, observation, exercise  Exercises  activating and problem-based methods - discussion, classic problem-based method |
| **3.5. Bibliography** | **Primary:** | 1. Pajdowski L., „Chemia ogólna” PWN 2002 2. Bielański A., „Podstawy chemii nieorganicznej” PWN 2004   3. Szmal Z., Lipiec T., „Chemia analityczna z elementami analizy instrumentalnej”, PZWL 1995  4. Cotton A. F., „Chemia nieorganiczna podstawy” PWN 1995 |
| **Supplementary:** | 1. Minczewski Z., Marczenko J., „Chemia analityczna” t. 1 PWN 2012 2. Cieślak-Golonka M., Starosta J., Wasilewski M., „Wstęp do chemii koordynacyjnej”, PWN 2010   Zając M., Jelińska A., Musialska I., Nogowska M., Stanisz B., „Ocena jakości substancji leczniczych i preparatów farmaceutycznych według wymagań farmakopealnych” Wydawnictwo Kontekst, Poznań 2000 |

**4. OBJECTIVES, CONTENT, AND LEARNING OUTCOMES**

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| **4.1. Course Objectives**  **Lecture**  C1 – introduction of basic chemical laws and concepts in the field of general chemistry;  C2 – familiarization of students with contemporary views on the structure of matter, with particular emphasis on the structure of the atom and molecule and the laws governing chemical reactions;  C3 – presentation of selected aspects of inorganic chemistry in the context of preparing prescription drugs; C4 – based on concepts from coordination and bioinorganic chemistry, demonstration of the possibilities of using inorganic and coordination compounds in diagnostics and therapy;  **Exercises**  C1 – familiarization with methods of solving calculation problems in the field of general chemistry; C2 – solving problems resulting from the topics of lectures. |
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| **4.2. Course Content**  **Winter semester**  **Lecture**  Basic chemical laws and concepts. The structure of the atomic nucleus. Natural and artificial radioactivity. Properties of radioactive isotopes and their use in diagnostics and therapy. Quantum-mechanical theory of the structure of the atom, atomic orbitals. The relationship between the periodic table and the structure of the atom. Chemical bonds in classical and quantum terms. Irreversible and reversible processes. The law of mass action. The rule of contradiction. Equilibrium in aqueous solutions: types of solutions (true solutions, colloids and suspensions), solubility, solubility product, electrolytic dissociation, weak and strong electrolytes, modern theories of acids and bases, ionic product of water, pH, hydrolysis, buffer solutions, pH indicators, amphoteric compounds. Redox processes: reduction and oxidation reactions, reduction-oxidation potential, electrolysis processes and the operation of galvanic cells.  **Exercises**  Basics of stoichiometric calculations. Calculation exercises in the scope of preparing, diluting, concentrating and mixing solutions. Calculations concerning ionic equilibria of strong electrolytes.  **Laboratory 45 hours**  Basics of laboratory work. Preparing, diluting and mixing solutions of different concentrations. Methods of purifying substances: crystallization, extraction, distillation. Reactions in aqueous solutions: dissociation, hydrolysis, buffer solutions. Redox reactions. Obtaining sparingly soluble salts. Solubility product. |
| **Summer semester**  **Lecture**  Physical and chemical properties of representative biononmetals (p-block of elements) and their compounds in terms of their occurrence in nature, the human body and their application in medicine and pharmacy. Physical and chemical properties of metals important from the point of view of biology, medicine and pharmacy and their compounds. Selected issues in the field of coordination and bioinorganic chemistry: nomenclature of complex compounds, types of ligands and complexes, labile and passive complexes, isomerism of complex compounds. Thermodynamic characteristics of complex formation equilibria in solution. Crystal field theory and application to the interpretation of magnetic properties and electronic spectra. Functions of metallic elements in life processes based on complex compounds. Organometallic compounds as drugs (chemotherapeutics and inorganic drugs).  **Laboratory**  Identification of inorganic compounds:  1) Qualitative analysis of cations of groups I-V - analysis of a mixture of cations of individual groups and analysis of a mixture of cations from groups I-V.  2) Qualitative analysis of anions of groups I-VI - analysis of a mixture of anions of individual groups and a mixture of anions of groups I-III, IV-VI and I-VI.  3) Qualitative analysis of salts from the group of microelements and selected salts with toxic cations.  Study of chemical properties of selected elements of the s, p and d blocks and their characteristic reactions (oxygen, sulfur, halogens, iron, copper, silver). Obtaining and studying chemical properties of aqua-, amine-, chloro-, hydroxo complexes of transition metals. Preparation of selected inorganic preparations and complex compounds. |

## 4.3. Subject learning outcomes

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| **Code** | **A student, who passed the course** | **Relation to learning**  **outcomes** |
|  | within the scope of KNOWLEDGE: |  |
| W01 | the structure of the atom and the molecule, the periodic table of chemical elements and the properties of elements, including radioactive isotopes in the aspect of their use in diagnostics and therapy; | FAR\_B.W5. |
| W02 | mechanisms of formation and types of chemical bonds and mechanisms of intermolecular interactions; | FAR\_B.W6.. |
| W03 | types and properties of solutions and methods of their preparation; | FAR\_B.W7. |
| W04 | basic types of chemical reactions; methods of identifying inorganic substances. | FAR\_B.W8. |
| W05 | characteristics of metals and nonmetals and the nomenclature and properties of inorganic compounds used in the diagnosis and therapy of diseases; | FAR\_B.W9 |
| W06 |  | FAR\_B.W10 |
|  | within the scope of **ABILITIES:** |  |
| U01 | measure or determine physical, biophysical and physicochemical quantities using appropriate laboratory equipment and perform physical and chemical calculations; | FAR\_B.U1.. |
| U02 | identify inorganic substances; | FAR\_B.U4. |
| U03 | perform qualitative and quantitative analyses of elements and chemical compounds and assess the reliability of the analysis result. | FAR\_B.U7. |
|  | within the scope of SOCIAL COMPETENCE: |  |
| K01 | formulating conclusions from your own measurements or observations; | FAR\_K.08. |
| K02 | using objective sources of information. | FAR\_K.07. |
| K03 | noticing and recognizing one’s own limitations, making self-assessment of deficits and educational needs; | FAR\_K.02. |

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| **4.4. Methods of assessment of the intended learning outcomes** | | | | | | | | | | | | | | | |  | | |  | | |
| **Teaching**  **outcomes**  **(code)** | **Method of assessment (+/-)** | | | | | | | | | | | | | | |  | | |  | | |
| **Exam oral/written**  **\*** | | | **Colloquium\* written or oral** | | | **Project\*** | | | **Effort**  **in class\*** | | | **Self-study\*** | | | **Group**  **work\*** | | | **Others\* e.g.**  **standardized test**  **used in elearning** | | |
| Form of classes | | | Form of classes | | | Form of classes | | | Form of classes | | | Form of classes | | | Form of classes | | | Form of classes | | |
| *L* | *E* | *Lab* | *L* | *E* | *Lab* | *L* | *E* | *Lab* | *L* | *E* | *Lab* | *L* | *E* | *Lab* | *L* | *E* | *Lab* | *L* | *E* | *Lab* |
| W01 | **+** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| W02 | **+** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| W03 | **+** |  |  |  | **+** | **+** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| W04 | **+** |  |  |  | **+** | **+** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| W05 | **+** |  |  |  |  | **+** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| W06 | **+** |  |  |  |  | **+** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| U01 |  |  |  |  | **+** | **+** |  |  |  |  |  |  |  |  |  |  |  |  |  |  | **+** |
| U02 |  |  |  |  | **+** | **+** |  |  |  |  |  |  |  |  |  |  |  |  |  |  | **+** |
| U03 |  |  |  |  |  | **+** |  |  |  |  |  |  |  |  |  |  |  |  |  |  | **+** |
| K01 |  |  |  |  | **+** | **+** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| K02 | **+** |  |  |  | **+** | **+** |  |  |  |  |  |  |  |  |  |  |  |  |  |  | **+** |
| K03 |  |  |  |  | **+** | **+** |  |  |  |  |  |  |  |  |  |  |  |  |  |  | **+** |

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| **4.5. Criteria of assessment of the intended learning outcomes** | | |
| **Form of**  **classes** | **Grade** | **Assessment criterion** |
| **(lecture (L) \*** | **3** | Passed laboratory and exercises in general and inorganic chemistry and the result of the written exam is 61-68% |
| **3,5** | Passed laboratory and exercises in general and inorganic chemistry and the result of the written exam is 69-76% |
| **4** | Passed laboratory and exercises in general and inorganic chemistry and the result of the written exam is 77-84% |
| **4,5** | Passed laboratory and exercises in general and inorganic chemistry and the result of the written exam is 85-92% |
| **5** | Passed laboratory and exercises in general and inorganic chemistry and the result of the written exam is 61-68% 93-100% |
| **Eexercises (E)** | **3** | 61-68% of the maximum number of points in written tests |
| **3,5** | 69-76% of the maximum number of points in written tests |
| **4** | 77-84% of the maximum number of points in written tests |
| **4,5** | 85-92% of the maximum number of points in written tests |
| **5** | 93-100 % of the maximum number of points in written tests |
| **laboratory**  **(L)** | **3** | All analyses passed on the scheduled dates and the average score from the tests was 61-68% |
| **3,5** | All analyses passed on the scheduled dates and the average score from the tests was 69-76% |
| **4** | All analyses passed on the scheduled dates and the average score from the tests was 77-84% |
| **4,5** | All analyses passed on the scheduled dates and the average score from the tests was 85-92% |
| **5** | All analyses passed on the scheduled dates and the average score from the tests was 93-100% |

# 5. BALANCE OF ECTS CREDITS – STUDENT’S WORK INPUT

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| **Kategoria** | **Student's workload** | |
| **Full-time**  **studies** | **Extramural studies** |
| *NUMBER OF HOURS WITH THE DIRECT PARTICIPATION OF THE TEACHER*  */CONTACT HOURS/* | ***105*** |  |
| *Participation in lectures* | 35 |  |
| *Participation in exercises* | 10 |  |
| *Participation in laboratories* | 60 |  |
| *SAMODZIELNA PRACA STUDENTA /GODZINY NIEKONTAKTOWE/* | 70 |  |
| *Preparation for exercises, laboratory* | 35 |  |
| *Preparation for the exam/colloquium* | 35 |  |
| ***TOTAL NUMBER OF HOURS*** | ***175*** |  |
| **ECTS credits for the course of study** | **7** |  |

***I accept for implementation (date and legible signatures of persons teaching the subject in a given academic year)***

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