# DESCRIPTION OF THE COURSE OF STUDY

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| **Course code** |  | **0917LEK-B2.3-Ch** |
| **Name of the course in** | Polish | **Chemia** |
| English | **Chemistry** |

## 1. LOCATION OF THE COURSE OF STUDY WITHIN THE SYSTEM OF STUDIES

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| **1.1. Field of study** | medicine |
| **1.2. Mode of study** | Full-time |
| **1.3. Level of study** | Uniform Master’s study |
| **1.4. Profile of study\*** | General academic |
| **1.5. Person preparing the course description** | dr Dariusz Wideł |
| **1.6. Contact** | dariusz.widel@ujk.edu.pl |

## 2. GENERAL CHARACTERISTICS OF THE COURSE OF STUDY

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| **2.1. Language of instruction** | English |
| **2.2. Prerequisites\*** | Knowledge of general chemistry, inorganic and organic at the advanced level of secondary school. |

## 3. DETAILED CHARACTERISTICS OF THE COURSE OF STUDY

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| **3.1. Form of classes** | | lecture– 25 hours including 5 h e-learning; laboratory classes– 20 hours |
| **3.2. Place of classes** | | Courses in the teaching rooms of the UJK  The Faculty of Natural Sciences, The Institute of Chemistry |
| **3.3. Form of assessment** | | Laboratory-credit with grade, written exam |
| **3.4. Teaching methods** | | Informative lecture, explaining and problem-based, laboratory classes |
| **3.5. Bibliography** | **Required reading** | An Introduction to General, Organic, and Biological Chemistry, Global Edition Autor: [Timberlake Karen,](http://www.enbook.pl/catalogsearch/result/?q=Timberlake%20Karen) ed. by Pearson Higher Education ,  2015 |
| **Further reading** | John E. McMurry - Organic Chemistry - 8th edition in pdf |

## 4. OBJECTIVES, SYLLABUS CONTENT AND INTENDED TEACHING OUTCOMES

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| **4.1. Course objectives (including both forms of classes)**  C1- Mastering the basic knowledge in the field of general, analytical and organic chemistry.  C2 - Understanding the properties of inorganic and organic compounds important in biochemistry.  C3 - Conducting chemical calculations and interpretation of the results of conducted experiments.  C4 - Mastering the basics of work in a chemical laboratory and elements quantitative analysis of organic and inorganic compounds.  C5- Development of proper ethical attitudes and abilities to properly communicate. |
| ***4.2.* Detailed syllabus**  **Lecture**  The water in the human body. The structure and chemical properties of water. The influence of dissolved substances on the properties of the solutions. Diffusion and osmosis. The osmolarity and tonicity. The Donnan equilibrium. Acid-base balance. The concentration of hydrogen ions, the pH concept. Buffer solutions and function. Henderson-Hasselbalch equation. Buffer capacity. Elements of classical quantitative analysis. Functional groups of organic compounds and nomenclature. Tautomerism. The importance of stereochemistry relates to properties of organic compounds. Chiral molecules. Aromatic hydrocarbons and some their derivatives of biological importance.  Amino acids and proteins: structure and classification, physicochemical properties, isoelectric point, peptide bond. Carbohydrates: classification, the chemical properties of monosaccharides, types of isomerism. Some sugar derivatives of biological importance. Lipids: fatty acids – structure and terminology, Triacylglycerols. The heteroaromatic compounds of five and six membered rings with one and two and heteroatoms. The nitrogenous bases: structure and importance in biochemistry.  **Laboratory**  Practical classes related to selected methods of quantitative and qualitative analysis, simple chemical measurements, and experiments in chemistry laboratory. Qualitative analysis of biological important cations and anions. Acid-base titration. Spectrophotometric determination of protein. Properties of buffer solutions. |

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| **Code** | **A student, who passed the course** | **Relation to teaching outcomes** |
|  | within the scope of **KNOWLEDGE**, the graduate knows and understands**:** |  |
| W01 | basic reactions of organic and non-organic compounds in water solutions | B.W4. |
| W02 | the concepts of: solubility, osmotic pressure, isotonia, colloidal solutions and Gibbs-Donnan effect; | B.W3. |
| W03 | acid-base homeostasis and mechanisms of buffers and their significance in systemic homeostasis; | B.W2. |
| W04 | the structure of simple organic compounds included in the macromolecules present in the cells, extracellular matrix and body fluids | B.W10. |
| W05 | the structure of lipids and polysaccharides and their functions in the cellular and extracellular structures | B.W11. |
|  | within the scope of **ABILITIES**, the graduate knows how to**:** |  |
| U01 | determine molar and percentage concentration of compounds and the concentration of substances in isoosmotic solutions, both mono- and multi-component | B.U3. |
| U02 | determine the solubility of inorganic compounds, chemical substrate for the solubility of organic compounds, or lack thereof, and practical significance for nutrition and therapy; | B.U4. |
| U03 | determine the pH of the solution and the effect of changes in the pH on the inorganic and organic compounds; | B.U5. |
| U04 | apply basic laboratory techniques, such as qualitative analysis, titration, colorimetry, pehametry, chromatography, electrophoresis of proteins and nucleic acids; | B.U8. |
| U05 | operate simple measuring instruments and evaluate the accuracy of measurements; | B.U9. |

**4.3.Education outcomes in the discipline**

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| within the scope of **SOCIAL COMPETENCE**, the graduate is able to: | | |
| K01 | recognize his/her own limitations and self-evaluate educational deficiencies and needs; | H.S5 |
| K02 | use reliable information sources; | H.S7 |
| K03 | conclude on the basis of own surveys and observations; | H.S8 |
| K04 | introduce rules of social conduct and teamwork to the group of specialists, including specialists form other medical professions also in the multicultural and multinational environment; | H.S9 |
| K05 | give opinions concerning various aspects of professional activity; | H.S10 |
| K06 | take responsibility for own decisions made during professional activities including own safety and safety of other people; | H.S11 |

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| **4.4. Methods of assessment of the intended teaching outcomes** | | | | | | | | | | | | | | | | | | | | | | |
| **Teaching outcomes**  ***(code)*** | **Method of assessment (+/-)** | | | | | | | | | | | | | | |  | | |  | | | |
| **Exam**  **~~oral~~/written\*** | | | **Test\*** | | | **Project\*** | | | **Effort in class\*** | | | **Self-study\*** | | | **Group**  **work\*** | | | **Others (lab. reports)\*** | | | **Observation** |
| ***Form of classes*** | | | ***Form of classes*** | | | ***Form of classes*** | | | ***Form of classes*** | | | ***Form of classes*** | | | ***Form of classes*** | | | ***Form of classes*** | | | ***Form of classes*** |
| *L* | *C* | *...* | *L* | *C* | *...* | *L* | *C* | *...* | *L* | *C* | *...* | *L* | *C* | *...* | *L* | *C* | *...* | *L* | *C* | *..*  *.* | *L/ C* |
| W01 | ***+*** | ***-*** |  | ***-*** | ***+*** |  | ***-*** | ***-*** |  | ***+*** | ***+*** |  | ***+*** | ***+*** |  | ***-*** | ***+*** |  | ***-*** | ***+*** |  |  |
| W02 | ***+*** | ***-*** |  | ***-*** | ***+*** |  | ***-*** | ***-*** |  | ***+*** | ***+*** |  | ***+*** | ***+*** |  | ***-*** | ***+*** |  | ***-*** | ***+*** |  |  |
| W03 | ***+*** | ***-*** |  | ***-*** | ***+*** |  | ***-*** | ***-*** |  | ***+*** | ***+*** |  | ***+*** | ***+*** |  | ***-*** | ***+*** |  | ***-*** | ***+*** |  |  |
| W04 | ***+*** | ***-*** |  | ***-*** | ***+*** |  | ***-*** | ***-*** |  | ***+*** | ***+*** |  | ***+*** | ***+*** |  | ***-*** | ***+*** |  | ***-*** | ***+*** |  |  |
| W05 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| U01 | ***+*** | ***-*** |  | ***-*** | ***+*** |  | ***-*** | ***-*** |  | ***+*** | ***+*** |  | ***+*** | ***+*** |  | ***-*** | ***+*** |  | ***-*** | ***+*** |  |  |
| U02 | ***+*** | ***-*** |  | ***-*** | ***+*** |  | ***-*** | ***-*** |  | ***+*** | ***+*** |  | ***+*** | ***+*** |  | ***-*** | ***+*** |  | ***-*** | ***+*** |  |  |
| U03 | ***-*** | ***-*** |  | ***-*** | ***-*** |  | ***-*** | ***-*** |  | ***+*** | ***+*** |  | ***+*** | ***+*** |  | ***+*** | ***-*** |  | ***-*** | ***+*** |  |  |
| U04 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| U05 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| K01-K06 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | ***+*** |

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| **4.5. Criteria of assessment of the intended teaching outcomes** | | |
| **Form of classes** | **Grade** | **Criterion of assessment** |
| **lecture (L)** | **3** | Achievement 61 - 68% of the total number of points from written exam. |
| **3,5** | Achievement 69 - 76% of the total number of points from written exam |
| **4** | Achievement 77 - 84% of the total number of points from written exam. |
| **4,5** | Achievement 85 - 92% of the total number of points from written exam. |
| **5** | Achievement 93 - 100% of the total number of points from written exam. |
| **classes (C)\*** | **3** | Accomplishment of laboratory classes and achievement 61-68% of the total number of points from written partition tests. |
| **3,5** | Accomplishment of laboratory classes and achievement 69-76% of the total number of points from written partition tests. |
| **4** | Accomplishment of laboratory classes and achievement 77-84% of the total number of points from written partition tests. |
|  | **4,5** | Accomplishment of laboratory classes and achievement 85-92% of the total number of points from written partition tests. |
|  | **5** | Accomplishment of laboratory classes and achievement 93-100% of the total number of points from written partition tests. |

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

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| **Category** | **Student's workload** |
| **Full-time studies** |
| *NUMBER OF HOURS WITH THE DIRECT PARTICIPATION OF THE TEACHER /CONTACT HOURS/* | **45** |
| *Participation in lectures\** | **20** |
| *Participation in classes, seminars, laboratories\** | **20** |
| *Preparation in the exam/ final test\** |  |
| *Others\** | **51** |
| *INDEPENDENT WORK OF THE STUDENT/NON-CONTACT HOURS/* | **55** |
| *Preparation for the lecture\** |  |
| *Preparation for the classes, seminars, laboratories\** | **25** |
| *Preparation for the exam/test\** | **30** |
| *Gathering materials for the project/Internet query\** |  |
| *Preparation of multimedia presentation* |  |
| *Others\** |  |
| *TOTAL NUMBER OF HOURS* | **100** |
| ECTS credits for the course of study | **4** |

***\*delete as appropriate***

1 e-learning (without participation of the lecturer)

***Accepted for execution*** *(date and signatures of the teachers running the course in the given academic year)*

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