**Learning outcomes of the programme:**

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| **1.** | **Field of study** | **Chemistry** |
| 2. | Academic year of entry | 2016/2017 (winter term) |
| 3. | Level of qualifications/degree | first-cycle studies |
| 4. | Degree profile | general academic |

| Code of the learning outcome of the programme | **Learning outcomes**<br>The graduate: | Codes of the learning outcomes of the areas of education to which the learning outcome of the programme is related |
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| | **KNOWLEDGE** | |
| CH_W01 | recognises and appreciates the role of chemistry in everyday life, understands its significance for the development of civilization and technology and comprehend the interdisciplinary character of chemistry as a science | X1A_W01 |
| CH_W02 | has knowledge and understanding of the elementary laws and chemical notions governing the microworld and is able to illustrate them with proper examples | X1A_W01 |
| CH_W03 | knows the nomenclature of chemical compounds, principles of determining empirical and structural formulas of chemical compounds, is able to enumerate the basic groups of chemical compounds | X1A_W01 |
| CH_W04 | knows the electron structure of small particles and is able to explain it | X1A_W01 |
| CH_W05 | understands the mechanisms of bonding and its types | X1A_W01 |
| CH_W06 | understands the electron structure of atoms in correlation with their location in the periodic table of elements | X1A_W01 |
| CH_W07 | is able to explain the relations between molecular structure and macroscopic properties of the surrounding matter | X1A_W01 |
| CH_W08 | is able to describe the states of aggregation of matter and their properties, the structure of the atom, the properties of the elements and inorganic compounds as well as their application | X1A_W01 |
| CH_W09 | knows the methods of classical qualitative and quantitative analysis | X1A_W01 |
| CH_W10 | is able to characterise chemical properties of selected cations and anions | X1A_W01 |
| CH_W11 | demonstrates knowledge of chemical and instrumental methods applied in the analysis of specific chemical products and compound materials | X1A_W01, X1A_W05 |
| CH_W12 | is able to explain at the basic level the notions found in the following chemistry disciplines: general chemistry, analytical chemistry, inorganic chemistry, organic chemistry, quantum mechanics, physical chemistry, crystallography and chemical technology | X1A_W01 |
| CH_W13 | has the advanced knowledge of the notions found in the following chemistry disciplines: physical chemistry, organic and inorganic chemistry | X1A_W01 |
| CH_W14 | is able to enumerate the properties of modes of industrial manufacturing and analysis of selected chemical products | X1A_W01 |
| CH_W15 | knows the physical and chemical properties of selected materials and basic principles of managing chemicals and of health and safety at work | X1A_W06 |
| CH_W16 | has the knowledge of decomposition and synthesis of macromolecules making part of living organisms, of the processes whereby these molecules obtain energy and of the mechanisms of metabolic regulation enabling the proper functioning of the living organisms | X1A_W01 |
| CH_W17 | has the knowledge of and understands the significance of the basic biomacromolecules | X1A_W01 |
| CH_W18 | knows the basic aspects of structure and functioning of measuring instruments and chemical equipment | X1A_W05 |
| CH_W19 | has the knowledge of the basic notions found in physics and higher mathematics and is able to enumerate examples of applications of physics and mathematics in chemistry | X1A_W01, X1A_W02, X1A_W03 |
| CH_W20 | knows the basic calculation and statistical methods applied in solving typical problems in the area of chemistry, is able to develop experimental outcomes and to enumerate examples of applying the above methods in chemistry | X1A_W04 |
| CH_W21 | demonstrates knowledge of labour law and legal basics indispensable for practicing the acquired profession | X1A_W07, X1A_W08 |
| CH_W22 | has knowledge of issues regarding the protection of intellectual property | X1A_W08 |
| CH_W23 | has the knowledge of the basic issues regarding the establishment and running a sole proprietorship where expertise in chemistry can be used | X1A_W09 |
| CH_W24 | has the knowledge of the given major | X1A_W01 |
| CH_W25 | has the knowledge of the role of physics as an interdisciplinary subject at the nexus of natural sciences | X1A_W01 |

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| CH_W26 | knows the fundamental laws and formulas in the area of basic physics such as electricity and magnetism and optics | X1A_W01 |
| CH_W27 | understands the relations between the achievements in the area of physics and the possibilities of applying them in practice | X1A_W01 |
| CH_W28 | knows the fundamental laws and formulas of basic physics such as mechanics | X1A_W01 |
| CH_W29 | knows and understands the basic notions and issues in the area of interdisciplinary subjects not related to the chosen programme | X1A_W01 |
| CH_W30 | has the general knowledge concerning given scientific methods and knows the issues characteristic for the scientific discipline not related to the chosen programme | |
| **SKILLS** | | |
| CH_U01 | applies chemical nomenclature of various classes of chemical compounds in compliance with IUPAC recommendations | X1A_U01 |
| CH_U02 | is able to write equations of chemical reactions | X1A_U01 |
| CH_U03 | solves basic calculation exercises in the area of given chemistry disciplines | X1A_U01 |
| CH_U04 | analyses the properties of elements and selected classes of inorganic compounds in the context of the law of periodicity | X1A_U01 |
| CH_U05 | applies basic notions of organic chemistry in order to solve problems related to structure, reactivity and obtaining the organic compounds | X1A_U01 |
| CH_U06 | solves problems related to structure, reactivity and obtaining inorganic compounds and substances making use of their properties | X1A_U01 |
| CH_U07 | interprets simple mechanisms of chemical reactions of inorganic and organic compounds | X1A_U01 |
| CH_U08 | analyses and predicts the properties and reactivity of inorganic, coordination and organometallic compounds | X1A_U01 |
| CH_U09 | is able to conduct simple reactions of synthesis of selected inorganic and organic compounds | X1A_U03 |
| CH_U10 | is able to apply the analytic procedure in order to determine the composition of compound materials | X1A_U02 |
| CH_U11 | is able to determine the composition and characterise the properties of metals, ceramics and polymers | X1A_U01 |
| CH_U12 | is able to interpret processes occurring in the living organisms by way of decomposition and synthesis of macromolecules | X1A_U01 |
| CH_U13 | is able to determine the symmetry of crystals and conducts a stereographic projection of their walls and symmetrical elements | X1A_U01 |
| CH_U14 | applies the international symbols of point groups and space groups | X1A_U01 |
| CH_U15 | applies the international tables for crystallography | X1A_U01 |
| CH_U16 | is able to explain the electron structure of atoms, organic and inorganic compounds | X1A_U01 |
| CH_U17 | is able to conduct simple quantum chemical calculations | X1A_U01 |
| CH_U18 | is able to determine the energetic levels in simple quantum systems (harmonic oscillator, rigid rotor, hydrogen atom and hydrogen-like ions) | X1A_U01 |
| CH_U19 | is able to relate the properties of a given substance to the energy of intra-molecular interactions | X1A_U01 |
| CH_U20 | applies the principles of safe treatment of chemicals | X1A_U03 |
| CH_U21 | is able to construct simple sets to measure physical and chemical quantities with the use of the equipment available in the laboratory | X1A_U02, X1A_U03 |
| CH_U22 | employs basic laboratory equipment and conducts basic laboratory tasks | X1A_U03 |
| CH_U23 | is able to plan and conduct simple chemical experiments, conduct observations and analyse the obtained outcomes | X1A_U03 |
| CH_U24 | identifies various factors that may affect the research as well as sources of measurement errors | X1A_U03 |
| CH_U25 | assesses the reliability of experimental outcomes applying the basics of error calculation and mathematical statistics; critically interprets the outcomes of measurements and research | X1A_U01 |
| CH_U26 | is able to assess the realization of chemical processes at the industrial scale | X1A_U03 |
| CH_U27 | prepares reports and summaries on the basis of the experiments/assignments/tasks | X1A_U04 |
| CH_U28 | is able to use the calculation package in order to conduct simple calculations and visualizations of experimental outcomes | X1A_U04 |
| CH_U29 | prepares short reports regarding given chemical problems, including the English language versions | X1A_U05, X1A_U08 |
| CH_U30 | uses scientific language typical for chemical sciences | X1A_U06 |
| CH_U31 | independently acquires knowledge about selected chemistry issues | X1A_U07 |
| CH_U32 | conducts independent research of selected information concerning chemistry in library and online resources | X1A_U08 |
| CH_U33 | prepares and performs short presentations regarding specific issues in Polish and/or English on the basis of diverse sources of information | X1A_U09 |

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| CH_U34 | knows at least one foreign language to the extent enabling perusal of professional literature, specific for a given major and is able to communicate at B2 level | X1A_U10 |
| CH_U35 | discusses and assesses views and opinions presented by other students on the basis of the knowledge obtained in the course of studies | X1A_U01 |
| CH_U36 | applies typical user software | X1A_U04 |
| CH_U37 | calculates finite limits, derivatives and integrals, solves linear equation systems and certain classes of ordinary differential equations | X1A_U01, X1A_U04 |
| CH_U38 | applies mathematical methods to solve problems in the area of chemistry and physics | X1A_U01, X1A_U04 |
| CH_U39 | conducts measurements of basic physical quantities | X1A_U03 |
| CH_U40 | applies international system of units (SI system) | X1A_U04 |
| CH_U41 | is able to describe and interpret basic physical phenomena | X1A_U01 |
| CH_U42 | applies to a basic degree the selected programming language | X1A_U04 |
| CH_U43 | is able to identify and analyse problems on the basis of the information from the discipline not related to the chosen programme | |
| **SOCIAL COMPETENCES** | | |
| CH_K01 | is aware of their level of knowledge and understands the necessity of life-long learning | X1A_K01, X1A_K07 |
| CH_K02 | is interested in basic chemical processes occurring in the environment | X1A_K01 |
| CH_K03 | is aware of the necessity to approach the chemical processes globally and relates to the knowledge gained in the course of studies in order to interpret them | X1A_K01 |
| CH_K04 | is able to cooperate and work in a team; is responsible for the assignments realised in a team | X1A_K02, X1A_K06 |
| CH_K05 | understands the necessity of systematic work that needs to be undertaken while conducting long-term projects | X1A_K03, X1A_K05 |
| CH_K06 | is responsible for the safety of their own and others' work | X1A_K04 |
| CH_K07 | is able to independently search for the information in professional literature in order to raise their professional and personal competences | X1A_K05 |
| CH_K08 | understands the necessity of presenting selected popular scientific problems to non-professionals | X1A_K05, X1A_K06 |
| CH_K09 | understands the significance of intellectual integrity and acts in an ethical manner | X1A_K06 |
| CH_K10 | understands the necessity of an interdisciplinary approach to the problems solved, integrates the knowledge gained in the area of various disciplines and understands the necessity of developing self-study practices aimed at expanding their knowledge | |