

**Learning outcomes for the CHEMISTRY course
first degree program, profile: general academic**

Location of the course within the area of education:

The CHEMISTRY course belongs to the area of education related to exact sciences.

Explanation of the symbol designations

K (before the underscore) - learning outcomes for the course of study

W - knowledge category

U - skills category

K (after the underscore) - social competencies category

X1A - learning outcomes in the area of education related to exact sciences for the first degree program

01, 02, 03 and next - learning outcome number

Field effects symbols	Upon completion of the first degree program in CHEMISTRY, the graduate will:	Reference to outcomes in the field of education in the field of science
Knowledge		
K_W01	Know the fundamentals of selected branches of mathematics useful in studying chemistry, in particular the fundamentals of mathematical analysis, algebra, and statistics	X1A_W02
K_W02	Know and understand the fundamentals of physics at a higher level necessary to describe phenomena and processes in the language of mathematics in the context of their applications in chemistry.	X1A_W03, X1A_W01

K_W03	Know the basic terms of general chemistry to the extent that will allow him/her to understand the teaching content in individual specialized fields of chemistry.	X1A_W01, X1A_W03
K_W04	Know and understand the theoretical and practical fundamentals of analytical determinations.	X1A_W01
K_W05	Have knowledge of extraction, physicochemical properties, reactivity and application of s- and p- block elements as well as of their inorganic compounds.	X1A_W01
K_W06	Have basic knowledge of the classification, nomenclature, structure, reactivity, reaction mechanisms, synthesis and role of selected classes of organic compounds and their role in the functioning of living organisms.	X1A_W01
K_W07	Have basic knowledge of the terms, transformation mechanisms and state functions in the field of physical chemistry.	X1A_W01
K_W08	Have basic knowledge of quantum chemistry.	X1A_W01
K_W09	Have knowledge of the models of the atomic nucleus, understand the processes of radioactive decay and the effects of radiation on matter, and know chemical processes occurring under the influence of ionizing radiation as well as isotopic exchange processes.	X1A_W01
K_W10	Have basic knowledge of selected technological and chemical engineering processes.	X1A_W01
K_W11	Have basic knowledge of the structure of crystals and molecules, and of methods of their study.	X1A_W01
K_W12	Know basic computational methods used in chemistry, selected numerical methods, the principles of algorithm design, the fundamentals of programming, and selected software	X1A_W04

	applications.	
K_W13	Know the basic aspects of the design and operation of scientific apparatus in scientific fields relevant to the chemistry course.	X1A_W05
K_W14	Know the basic rules of occupational safety and health.	X1A_W06
K_W15	Have basic knowledge of the legal and ethical requirements associated with scientific and teaching activities.	X1A_W07
K_W16	Know and understand the basic terms and rules of industrial property and copyright protection and be able to use patent information resources.	X1A_W08
K_W17	Know the fundamentals of management and marketing.	X1A_W09
K_W18	Have specialized knowledge of the selected major in the chemistry course.	X1A_W01
K_W19	Know the rules for rational and safe use of chemicals.	X1A_W01
SKILLS		
K_U01	Be able to define the basic terms and theorems of selected branches of mathematics and to apply them in practical computations used in chemistry and physics as well as in solving different problems occurring in the above fields of science.	X1A_U01
K_U02	Be able to use the knowledge of the fundamental laws of physics in order to understand various phenomena in the surrounding world.	X1A_U01 X1A_U03
K_U03	Be able to define basic chemical terms.	X1A_U01
K_U04	Be able to show the correlation of the structure of the atom and a chemical compound with its chemical properties.	X1A_U01

K_U05	Be able to describe the kinetics and balance of chemical reactions.	X1A_U01
K_U06	Be able to use correct chemical language.	X1A_U01
K_U07	Be able to characterize processes occurring in electrolyte solutions.	X1A_U01, X1A_U03
K_U08	Have the ability to perform basic activities in a chemical laboratory.	X1A_U01, X1A_U03
K_U09	Have the ability to prepare samples for analysis and to perform basic chemical analysis.	X1A_U01, X1A_U03
K_U10	Have the ability to assess the accuracy and possible scale of analytical determinations.	X1A_U01, X1A_U02
K_U11	Be able to use the current nomenclature of inorganic and organic compounds.	X1A_U01
K_U12	Be able to correctly write the molecular and structural formulas of chemical compounds.	X1A_U01
K_U13	Be able to write and balance chemical reactions and to predict the course of a chemical reaction.	X1A_U01
K_U14	Be able to use the relationships between thermodynamic functions and to apply the fundamental laws and principles of physical chemistry.	X1A_U01
K_U15	Be able to describe, also in quantitative terms, electrochemical processes, electrokinetic phenomena and show the knowledge of galvanic cells.	X1A_U01, X1A_U02
K_U16	Be able to distinguish types of chemical reactions and to describe the course of different chemical reactions.	X1A_U01
K_U17	Be able to write simple computer programs in a selected language.	X1A_U01, X1A_U04
K_U18	Be able to use numerical methods in chemical calculations.	X1A_U01, X1A_U04
K_U19	Be able to use basic software applications and scientific databases.	X1A_U01, X1A_U04

K_U20	Be able to use the acquired knowledge to design the synthesis of organic compounds.	X1A_U01, X1A_U03
K_U21	Be able to use operator formalism, to describe molecules by the Schrodinger equation, to interpret wave functions, to describe and analyze the concept of molecular and atomic orbital.	X1A_U01, X1A_U06
K_U22	Be able to interpret in physicochemical terms some processes occurring in living organisms.	X1A_U01, X1A_U06
K_U23	Be able to describe structured bodies in the language of crystallography.	X1A_U01
K_U24	Be able to analyze the transformations, nuclear reactions and problems relating to the law of radioactive decay.	X1A_U01
K_U25	Be able to select and use various radiation detectors.	X1A_U01
K_U26	Be able to use technological diagrams of industrial processes.	X1A_U01
K_U27	Be able to assess the importance of knowledge of chemical reactions and processes for their practical application in industrial processes.	X1A_U01
K_U28	Be able to assess the possibility of practical use of materials derived from chemical processes and their disposal after use.	X1A_U01
K_U29	Be able to assess the correlation between the knowledge acquired in courses specific to the selected major and the scope of knowledge in basic chemical subjects.	X1A_U01, X1A_U06
K_U30	Be able to create a report presenting outcomes achieved in laboratory classes and in solving problems during other types of classes.	X1A_U05, X1A_U03
K_U31	Be able to present in a concise and logical manner the essential facts from the basic fields of chemistry. Potrafi w sposób zwięzły i logiczny przedstawić podstawowe fakty w	X1A_U06

	zakresie podstawowych dziedzin chemicznych.	
K_U32	Have the ability to prepare papers on specific topics using basic theoretical approaches as well as various sources relevant to his/her course of study.	X1A_U08
K_U33	Have the ability to prepare oral presentations supported by computer graphics.	X1A_U09
K_U34	Be able to learn independently.	X1A_U07
K_U35	Be able to plan and carry out simple experiments, to prepare appropriate sets of Instruments and equipment and to analyze the obtained results.	X1A_U03, X1A_U02
K_U36	Have language skills at an intermediate level (B2) that will allow him/her, among others, to understand chemical texts.	X1A_U10
K_U37	Be able to use the provisions of law relating to the management of chemicals.	X1A_U01
SOCIAL COMPETENCE		
K_K01	Know the limitations of his/her knowledge and understand the need of further education.	X1A_K01, X1A_K05
K_K02	Be able to work in a team and understand the need of teamwork in research in the field of modern chemistry.	X1A_K02
K_K03	Be able to formulate issues that will serve to further deepen his/her knowledge.	X1A_K01, X1A_K03
K_K04	Appreciate and understand the importance of ethical conduct in any problems associated with the practice of the profession of chemist.	X1A_K04
K_K05	Be able to independently search for information in the literature, also in foreign languages.	X1A_K01
K_K06	Understand the social and environmental aspects of the development of chemical	X1A_K06

	sciences and their practical application.	
K_K07	Understand the importance of entrepreneurship in life.	X1A_K07