

**Learning outcomes for the CHEMISTRY course
second 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

Symbol	Upon completion of the second degree program in CHEMISTRY, the graduate will:	Reference to learning outcomes in the field of education in the field of science
KNOWLEDGE		
K_W01	Have in-depth knowledge of selected important branches of chemistry and of the importance of chemistry for the progress of exact and natural sciences as well as for the cognition of the world and development of civilization.	X2A_W01, X2A_W06
K_W02	Know mathematics to the extent necessary to understand problems in selected branches of chemistry and to describe them in the language of mathematics.	X2A_W02

K_W03	Know the fundamentals and possibilities of the most important analytical techniques and have broader knowledge on how to select an appropriate analytical method to analyze a specific sample.	X2A_W01, X2A_W03
K_W04	Have in-depth knowledge of chromatographic methods.	X2A_W01, X2A_W03
K_W05	Have knowledge of macromolecular compounds and methods of modifying their properties.	X2A_W01, X2A_W03, X2A_W06
K_W06	Have knowledge on the effects of nuclear and ionizing radiation on living organisms and concerning safe use of the phenomenon of radioactivity.	X2A_W01, X2A_W03
K_W07	Have broader knowledge of the electron structure of solids and selected methods of their study.	X2A_W01, X2A_W03
K_W08	Know the properties of transition elements and their compounds.	X2A_W01
K_W09	Know the fundamentals of statistical thermodynamics and computer simulation methods as well as modern computational methods in quantum chemistry.	X2A_W01, X2A_W03 X2A_W04
K_W10	Have broader knowledge of various phenomena occurring at the interface, including specialized knowledge of adsorption terms and phenomena.	X2A_W01, X2A_W03
K_W11	Have knowledge of intermolecular forces.	X2A_W01
K_W12	Know the basic terms of physicochemistry of dispersed systems.	X2A_W01,

K_W13	Have knowledge of surface-active compounds.	X2A_W01, X2A_W03
K_W14	Have knowledge of the description and classification of the symmetry of finite objects and infinite structured objects as well as of methods of their study.	X2A_W01, X2A_W03
K_W15	Know the physicochemical fundamentals and basic terms of selected spectral techniques.	X2A_W01, X2A_W03
K_W16	Know the theoretical fundamentals of the operation of scientific apparatus in scientific disciplines relevant to the chemistry course.	X2A_W05
K_W17	Know the occupational safety and health rules to the extent that will allow him/her to perform independent work in a test or measuring stand.	X2A_W07
K_W18	Have basic knowledge of the legal and ethical requirements associated with scientific and teaching activities.	X2A_W08
K_W19	Know and understand the basic terms and rules of industrial property and copyright protection as well as the need to manage intellectual property resources and be able to use patent information resources.	X2A_W09
K_W20	Know the fundamentals of management and marketing.	X2A_W10
SKILLS		
K_U01	Be able to interpret the results of research conducted using selected research methods frequently applied in chemistry.	X2A_U01, X2A_U02, X2A_U04
K_U02	Be able to select an appropriate analytical technique.	X2A_U01, X2A_U02, X2A_U04
K_U03	Be able to independently plan the course of instrumental analysis.	X2A_U01, X2A_U02,

		X2A_U04
K_U04	Be able to interpret the properties of solids, liquids, and gases.	X2A_U01, X2A_U02, X2A_U04,
K_U05	Be able to calculate the thermodynamic functions of ideal gas.	X2A_U01
K_U06	Be able to carry out a synthesis of selected compounds of transition metals and to investigate their physicochemical properties.	X2A_U01, X2A_U02, X2A_U04
K_U07	Be able to describe, also in quantitative terms, a number of important surface and interfacial phenomena.	X2A_U01
K_U08	Be able to classify colloidal systems, to characterize them and describe their properties.	X2A_U01
K_U09	Be able to determine and analyze the values characterizing surface-active compounds.	X2A_U01, X2A_U02, X2A_U04
K_U10	Be able to describe a number of interfacial phenomena in biological systems, industrial processes, and daily life.	X2A_U01
K_U11	Be able to obtain in practice different dispersed systems and to stabilize or destabilize them.	X2A_U01, X2A_U02, X2A_U04
K_U12	Be able to independently describe and classify the symmetry of crystal molecules and lattices as well as to analyze diffraction measurements.	X2A_U01
K_U13	Be able to design the entire process of chromatographic analysis.	X2A_U01, X2A_U02, X2A_U04
K_U14	Be able to read and interpret oscillation spectra and NMR of typical organic compounds.	X2A_U01, X2A_U02, X2A_U04,

K_U15	Be able to perform simulations using the Monte Carlo and molecular dynamics methods and to interpret the results of such simulations.	X2A_U01, X2A_U02, X2A_U04
K_U16	Be able to use his/her knowledge to solve problems with a medium level of complexity, both theoretically and practically.	X2A_U01, X2A_U02, X2A_U03, X2A_U04, X2A_U05
K_U17	Be able to carry out selected speciation analyses using direct and indirect methods.	X2A_U01, X2A_U02, X2A_U04
K_U18	Be able to assess the role of radionuclides in the environment and threats caused by them.	X2A_U01, X2A_U02
K_U19	Be able to use crystallographic databases and selected computer programs to describe the symmetry of molecules and crystals.	X2A_U01, X2A_U03
K_U20	Be able to assess the state and prospects of the chemical industry in Poland in relation to the global situation.	X2A_U01, X2A_U03, X2A_U06
K_U21	Know the nomenclature of coordination compounds.	X2A_U01
K_U22	Be able to design the synthesis of selected organic compounds.	X2A_U01, X2A_U02, X2A_U03
K_U23	Be able to assess the correlation between the knowledge acquired in courses specific to the selected major and specialization, and the scope of knowledge in basic chemical subjects.	X2A_U01, X2A_U02, X2A_U03, X2A_U04, X2A_U05,
K_U24	Be able to prepare documents and reports presenting outcomes achieved in classes as well as on a specific assigned topic.	X2A_U05
K_U25	Have the ability to prepare extensive papers on a selected topic in his/her major and	X2A_U05, X2A_U08

	specialization as well as a master's thesis.	
K_U26	Have the ability to prepare oral presentations supported by computer graphics.	X2A_U09
K_U27	Be able to plan and carry out simple research, to prepare appropriate sets of instruments and equipment as well as to analyze the obtained results.	X2A_U01, X2A_U02, X2A_U04,
K_U28	Have language skills at a B2+ level that will allow him/her, among others, to translate and understand chemical texts.	X2A_U10
K_U29	Be able to independently search for information in the literature, also in foreign languages.	X2A_U03
K_U30	Be able to define the directions of further education and to pursue self-learning.	X2A_U07
SOCIAL COMPETENCE		
K_K01	Know the limitations of his/her knowledge and understand the need of further education and also be able to inspire the learning process in others, in particular in the area of natural sciences.	X2A_K01, X2A_K05
K_K02	Be able to work in a team and understand the need of teamwork in research in the field of modern chemistry.	X2A_K02
K_K03	Be able to formulate issues that will serve to further deepen his/her knowledge.	X2A_K01, X2A_K03, X2A_K06
K_K04	Appreciate and understand the importance of ethical conduct in any problems associated with the practice of the profession of chemist.	X2A_K04
K_K05	Understand the importance of acquiring scientific information from the literature using computer	X2A_K01

	databases.	
K_K06	Understand the social and environmental aspects of the development of chemical sciences and their practical application.	X2A_K06
K_K07	Understand the importance of entrepreneurship in life.	X2A_K07
K_K08	Understand the need to promote among the general public the knowledge on how to properly handle chemical substances.	X2A_K04, X2A_K06