

## Study programme

### Part A) of the study programme \*

### Learning outcomes

<b>Faculty offering the field of study:</b>		<b>Faculty of Chemistry</b>
<b>Field of study:</b>		<b>Chemistry</b>
<b>Level of study:</b>		<b>Second-cycle studies</b>
<b>Level of the Polish Qualifications Framework:</b>		<b>Level 7</b>
<b>Degree profile:</b>		<b>General academic</b>
<b>Professional degree awarded to the graduate:</b>		<b>Magister</b>
<b>Allocation of the field of study within academic or artistic discipline(s), to which learning outcomes for a given field of study refer:</b>		<b>Discipline: Chemical Sciences (100%)</b> <b>Major discipline: Chemical Sciences</b>
<b>Symbol</b>	<b>Upon completion the graduate achieves the learning outcomes specified below:</b>	
<b>KNOWLEDGE</b>		
K_W01	The graduate has in-depth knowledge of main branches of chemistry, its development and significance to the progress in sciences and natural sciences as well as to the cognition and understanding of the world and human development.	
K_W02	The graduate has in-depth knowledge of a selected branch of chemistry.	
K_W03	The graduate has knowledge of synthesis and characteristics of inorganic and organic compounds, catalysts, adsorbents, carbon materials, natural and organometallic compounds, polymers, nanomaterials, and their practical use.	
K_W04	The graduate knows and understands processes occurring in an atomic nucleus. The graduate knows mathematical systems to the extent allowing to understand the kinetics of nuclear transformations; knows mechanisms and effects of the influence of ionising radiation on the matter. The graduate knows benefits and risks connected with the presence of radioisotopes in the natural environment, industry, medicine, and power industry.	
K_W05	The graduate knows how to find a relation between a chemical compound and the technological process, by which it is obtained, to control its quality, and manage waste. The graduate has sufficient knowledge enabling them to start and develop business activity involving chemical production and processing.	
K_W06	The graduate has theoretical and practical knowledge of modern methods of bioactive substances synthesis and identification.	
K_W07	The graduate knows terms which allow to determine the symmetry of a molecule and the crystallographic system, and uses the results to obtain information about a substance tested.	
K_W08	The graduate knows theoretical fundamentals of quantum chemistry computational methods and is familiar with at least one software package used for the electron structure computation as well as properties and reactivity of atoms and molecules. The graduate knows correlations between the results obtained by theoretical computations and various experimental techniques.	
K_W09	The graduate knows the rules of proper experiment planning and verification of results' reliability. The graduate has knowledge of statistical methods required for analysing experimental data.	

K_W10	The graduate knows theoretical principles of chemical apparatus operation, both for scientific and industrial purposes.
K_W11	The graduate has general knowledge of transition metals chemistry, its development trends and recent findings.
K_W12	The graduate knows and understands theoretical fundamentals of various analytical methods and their application in the interpretation of measurement results.
K_W13	The graduate knows advanced techniques applied in chemical processes.
K_W14	The graduate has sufficient knowledge of occupational health and safety regulations that allows to work on their own and perform unsupervised research or measurement-related work.
<b>SKILLS</b>	
K_U01	The graduate is able to use and capitalise on in-depth knowledge covering main branches of chemistry and use it creatively within the range of their specialisation.
K_U02	The graduate is able to enumerate ways in which humans use radioactive materials, to perform radiation intensity measurement as well as to interpret the results obtained.
K_U03	The graduate applies chemical knowledge to assess the possibility of carrying out a technological process, considering the selection of raw materials, production control and monitoring, waste disposal, and material balance calculations.
K_U04	The graduate is able to determine synthesis and transformation conditions of a natural compound, to select the method of its release from a natural source, and to carry out its analysis and quality assessment.
K_U05	The graduate is able to deal with Polish and international standards in order to determine certain physical and chemical properties of chemical substances.
K_U06	The graduate is able to prepare a workstation and plan the synthesis process of a specific compound or chemical product.
K_U07	The graduate is able to assess the quality of water on the basis of analytical processes carried out and is able to analyse phenomena occurring in the environment as well as in technological processes.
K_U08	The graduate is able to find information in scientific journals and popular science magazines as well as chemical databases published in both Polish and English. The graduate is able to specify scientific problems in chemistry, to search for solutions, to present the results of their work in the form of written reports both in Polish and in a foreign language as well as an individually prepared project.
K_U09	The graduate recognises the symmetry of a molecule and crystal lattice, is able to apply experimental techniques to identify substances and determine crystal lattice parameters.
K_U10	The graduate is able to determine properties of molecules with the use of theoretical methods such as spectroscopy, and to examine chemical reaction pathways. The graduate is able to select an optimal method and to carry out calculations, use the results to analyse experimental data as well as critically evaluate the results.
K_U11	The graduate is able to plan and carry out an experiment on their own as well as to analyse its results critically. The graduate is able to apply an exemplary software package for the statistical analysis of an experiment.
K_U12	The graduate is able to plan, find in the field literature, predict potential trends, perform and verify the method of synthesis, determination of composition and properties of a new chemical compound.
K_U13	The graduate is able to analyse selected types of spectra (e.g. NMR, UV-Vis, IR, EPR) and draw conclusions with regard to the structure of compounds. The graduate is able to search for and compare spectra with those collected in various databases.
K_U14	The graduate is able to deal with a selected group of analytical methods and to critically evaluate analysis results, and to discuss measurement errors.
<b>SOCIAL COMPETENCES</b>	
K_K01	The graduate is aware of their knowledge and its limitations and understands the need for lifelong learning. The graduate is able to undertake actions to extend and deepen the knowledge of chemistry on their own.
K_K02	The graduate is able to cooperate and work in a team (assuming various roles in this team) as well as to creatively solve problems concerning research studies and chemical synthesis.

K_K03	The graduate is aware of potential practical implementation and economic importance of chemical compounds and new materials as well as potential hazards connected with their use. The graduate is able to identify and solve related problems.
K_K04	The graduate knows legal, economic, environmental, and social aspects connected with the production of chemicals, use of bioenergy as well as industrial and municipal waste treatment. The graduate is aware of their responsibility for research and experiments undertaken.
K_K05	The graduate is able to specify priorities in order to solve a chemical problem posed by themselves or by other persons.
K_K06	The graduate is aware of the importance of being professional, recognises and appreciates intellectual honesty and integrity, and observes the code of professional ethics both in their actions and the actions undertaken by other persons.
K_K07	The graduate can formulate and present opinions on fundamental chemical issues and developments in this field.