S t u d y p r o g r a m m e

Part A) of the study programme *

L e a r n i n g o u t c o m e s

Faculty offering the field of study:	**Faculty of Chemistry**
Field of study:	**chemistry**
Level of study:	**second cycle**
Level of the Polish Qualifications Framework:	**Level 7**
Degree profile:	**general academic**
Professional degree awarded to the graduate:	**master of science (MSc)**
Allocation of the field of study within academic or artistic discipline(s), to which learning outcomes for a given field of study refer:	**Discipline: CHEMISTRY SCIENCE (100%)** **Major discipline: CHEMISTRY SCIENCE**
(1) Symbol	**(2) Upon completion the graduate achieves the learning outcomes specified below:**
KNOWLEDGE	
K_W01	The graduate has extended knowledge of the main branches of chemistry, its development and contribution to the progress in science and natural sciences as well as importance to understanding 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 as well as organic compounds, catalysts, absorbents, 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 extensively enough 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, control its quality, and manage waste. The graduate has sufficient knowledge to be able 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 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 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 to 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 independently and perform unsupervised research or measurement-related work.
SKILLS	
K_U01	The graduate is able to take advantage of extended knowledge covering main branches of chemistry and use it creatively within the range of his/her 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 performing a technological process, considering the selection of raw materials, production control, 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, 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 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 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 design and perform an experiment as well as 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 literature, predict possible 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 discuss measurement errors.

SOCIAL COMPETENCES	
K_K01	The graduate is aware of his/her level of knowledge and understands the need for lifelong learning. The graduate is able to undertake actions to extend and deepen the knowledge of chemistry.
K_K02	The graduate is able to cooperate with other persons and work in a team, assuming various roles 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 determine priorities in order to solve a chemical problem posed by him/herself or by other persons.
K_K06	The graduate is aware of the importance of being professional, recognising and appreciating intellectual honesty, observing the code of professional ethics both in his/her activities and activities undertaken by other persons.
K_K07	The graduate can formulate and present opinions on fundamental chemical issues and developments in this area.

* The study programme – Part A) – learning outcomes (with information under the table referring to the date of its adoption by the Faculty Board and the academic year it is to be effective from) must be signed by the Dean of the Faculty (1)

Explanatory notes:

K (before the underscore) – learning outcomes for the field of study

W – knowledge;

U – skills;

K (after the underscore) – social competences.

(2) The description of expected learning outcomes for studies conducted in a given field of study, level and profile in terms of knowledge, skills and social competen

This study programme-learning outcomes is effective as of winter semester of the academic year 2019/2020.

This study programme-learning outcomes was adopted by the Board of the Faculty of Chemistry on 13th march 2019.

/-/ Prof. dr hab. Edward Szłyk

(Dean's signature)