

Study programme*Part A) of the study programme ****Learning outcomes**

Faculty offering the field of study:	Faculty of Chemistry
Field of study:	Chemistry
Level of study:	First-cycle studies
Level of the Polish Qualifications Framework:	Level 6
Degree profile:	Academically oriented
Professional degree awarded to the graduate:	Bachelor of science (BSc)
Allocation of the field of study within academic or artistic discipline(s), to which learning outcomes for a given field of study refer:	Discipline: Chemical Sciences (100%) Major discipline: Chemical Sciences
Symbol	Upon completion the graduate achieves the learning outcomes specified below:
KNOWLEDGE	
K_W01	The graduate has advanced knowledge of principles of chemistry and the nomenclature.
K_W02	The graduate knows most important chemical elements and their compounds. The graduate knows ways of correlations between elements' properties and their primary chemical compounds, and the place of the element in the periodic table.
K_W03	The graduate has advanced knowledge of the principles of linear algebra, mathematical analysis and statistics necessary for the description and modelling of chemical phenomena.
K_W04	The knows the role of experiments and computer simulations in chemical processes
K_W05	The graduate knows basic software packages for the analysis and development of data
K_W06	The graduate knows theoretical and practical aspects of performing qualitative and quantitative analysis by means of conventional and instrumental methods as well as equipment operation rules.
K_W07	The graduate has advanced knowledge of functional groups of organic compounds and reaction mechanisms
K_W08	The graduate knows states of matter, state equations, theory of chemical kinetics, intermolecular interactions, laws of thermodynamics, phase equilibria, basics of electrochemistry
K_W09	The graduate is familiar with basic terms, concepts, principles and laws of physics and with their universal character to the extent sufficient to continue education
K_W10	The graduate knows basic concepts and advanced research methods of contemporary inorganic and coordination chemistry
K_W11	The graduate knows the basics of biochemistry and chemistry of metabolic processes
K_W12	The graduate knows techniques of collecting and preparing samples from environmental matrices for analysis, water quality indicators, toxicity tests, and methods of wastewater neutralisation
K_W13	The graduate has advanced knowledge of aspects of the construction and methods of assessment of properties of materials and chemical substances. The graduate has knowledge enabling them to use materials for a specified practical purpose and to indicate a method of their management after their lifetime.
K_W14	The graduate knows and understands the basics of quantum chemistry; postulates of quantum mechanics and their application to the description of atoms and molecules. The graduate knows and understands theoretical fundamentals of various molecular spectroscopies.
K_W15	The graduate has knowledge of technology and chemical engineering

K_W16	The graduate is aware of occupational health and safety regulations and basic concepts in toxicology. The graduate knows legal regulations pertaining to standards and requirements binding in chemical laboratories as well as legal regulations concerning hazardous substances, their storage and labelling.
SKILLS	
K_U01	The graduate is able to use chemical terminology and concepts in general chemistry
K_U02	The graduate is able to correlate properties of chemical elements and their chemical compounds with their place in the periodic table and to correlate chemical properties of substance with their modern applications
K_U03	The graduate is able to apply the methods of linear algebra and mathematical analysis in selected issues in physics and chemistry
K_U04	The graduate displays the ability to describe and model chemical phenomena and uses selected numerical procedures in chemical calculations
K_U05	The graduate is able to perform basic chemical measurements and is able to develop the results of physicochemical experiments
K_U06	The graduate is able to perform quantitative analyses using gravimetric, volumetric and instrumental methods on the basis of analytical procedures. The graduate is able to prepare an analysis-based report.
K_U07	The graduate is able to recognise functional groups of organic compounds and to perform experiments in organic chemistry
K_U08	The graduate recognises states of matter, and is able to define and describe physicochemical processes
K_U09	The graduate is able to develop simple physical experiments, analyse their results, and explain physical phenomena occurring in the surrounding world. The graduate is able to solve basic problems relying on the laws of physics
K_U10	The graduate is able to synthesise and separate simple inorganic compounds and selected coordination compounds
K_U11	The graduate is able to describe the structure and functions of macromolecular compounds occurring in living organisms and to specify metabolic changes occurring in major metabolic pathways as well as ways of storing and processing chemical energy in the cell
K_U12	The graduate is able to collect and prepare environmental samples and analyse them .
K_U13	The graduate is able to find correlations between material behaviour during formation and use, and physicochemical properties, structure and structural type.
K_U14	The graduate is able to use basic quantum numerical methods to describe, in qualitative terms, properties, structures and reactivity of chemical systems
K_U15	The graduate is able to solve basic problems related to the completion of technological processes
K_U16	The graduate is able to behave properly while facing a variety of emergencies, such as fire or contact with chemical reagents
K_U17	The graduate displays language skills in a modern foreign language at the intermediate level (B2 level) in daily life, in education-related situations and while preparing their diploma thesis
SOCIAL COMPETENCES	
K_K01	Analytical thinking: The graduate is able to work on his/her own and effectively with large amounts of data, to perceive interrelations between phenomena and draw correct conclusions using the principles of logic.
K_K02	Creativity: The graduate thinks creatively in order to improve existing solutions or develop new ones.
K_K03	Conscientiousness and accuracy: The graduate strives to complete a task as effectively as possible. The graduate is sensitive to details and is systematic
K_K04	Communication skills: The graduate is able to communicate the achievements of chemical knowledge to other persons effectively and clearly. The graduate adjusts the level and form of presentations to the needs and capabilities of receivers.
K_K05	Pursuit of development: The graduate is focused on the constant acquisition of new knowledge, skills and experience. The graduate acknowledges the need for constant self-improvement and increasing his/her professional skills. The graduate is aware of the limitations of their knowledge and understands the need for further education.

K_K06	Perseverance and consistency: The graduate works systematically and has a positive attitude to obstacles standing in the way of reaching the desired objectives. The graduate observes deadlines. The graduate understands the need to be systematic in all projects undertaken
K_K07	Autonomy: The graduate implements agreed objectives on his/her own, taking autonomous and sometimes difficult decisions. The graduate is able to find information in the field literature.
K_K08	Professionalism and ethics: The graduate knows and abides by the standards binding for chemists, including ethical standards. The graduate understands the social role of the profession. The graduate understands and recognises the importance of intellectual honesty and integrity, care of one's health and of the natural environment in activities undertaken by themselves and by other persons.
K_K09	Team work: The graduate is able to establish and maintain long-term and effective collaboration with other persons. The graduate endeavours to achieve the objectives of the team by proper planning and organisation of their own work and the work of other persons. The graduate motivates collaborators to increase their efforts in order to achieve the assumed objectives

Part B) of the study programme

Description of the process resulting in the achievement of learning outcomes

Faculty offering the field of study:	Faculty of Chemistry
Field of study:	Chemistry
Level of study:	First-cycle studies
Level of the Polish Qualifications Framework:	Level 6
Degree profile:	Academically oriented
Allocation of the field of study within academic or artistic discipline(s), to which learning outcomes for a given field of study refer:	Discipline: chemical sciences (100%) Major discipline: chemical sciences
Mode of study:	full-time programme
Number of semesters:	6
Number of ECTS required for the award of qualifications corresponding to the level:	180
Total number of teaching hours:	2130
Professional degree awarded to the graduate:	Bachelor of Science (BSc)
The relationship between the study programme and NCU mission and strategy:	<p>Programme of first-degree Chemistry is closely related to the mission of the Nicolaus Copernicus University involving the development and dissemination of knowledge. At the Faculty of Chemistry research in all major fields of experimental and theoretical chemistry are conducted for years. The results of these studies are well known not only in the country but in the international arena and published worldwide as well as presented during national and international scientific conferences. Teaching first degree chemistry is taught at university level, and other forms of education and popularization are implemented, corresponding to the current and future needs and aspirations of society.</p> <p>According to the strategy of Nicolaus Copernicus University the teachers and graduates work are evaluated and self-estimated, measure of which is reliability, high quality and a deep commitment to the universal ethical values.</p>

Courses/course modules along with expected learning outcomes *

Course module	Course	Expected learning outcomes	Forms and methods of teaching ensuring the achievement of learning outcomes	Methods of verifying and assessing expected learning outcomes achieved by the graduate
Basic course module I	Informatics in chemistry (+ USOS)	As knowledge of the foundations of analytical, physical, organic, inorganic, quantum chemistry and biochemistry.	Lecture: introductory method - problematic	Continuous assessment (involvement of

	Mathematics	<p>Has knowledge of basic terms, concepts, principles and laws of physics and their universal nature. He knows the postulates of quantum mechanics and their application to the description of atoms and molecules. He knows the role of computer simulations in chemistry and is able to use software package for data analysis and development.</p> <p>Knows the basic rules of safety and health at work in chemistry. Knows the basics of linear algebra, calculus and statistics necessary for the description and modeling of phenomena. Gains skills of geometric interpretation of problem solving, knowledge of elementary functions (single and multi-variable), their properties, the ability to manipulate matrices, solving systems of linear equations (including functions of several variables). He/she can plan and take measurements of chemical and physical values, and analyze samples by classical methods. Can suggest a chemical reaction mechanism and identify functional groups of organic compounds. Can conduct experiments in the field of organic and inorganic chemistry.</p> <p>Can use basic quantum numerical methods for qualitative description of the properties, structure, and reactivity of chemical systems. Is able to estimate the results of experiments and apply the methods of linear algebra and mathematical analysis of selected topics in physics and chemistry. using the mathematical analysis apparatus to the study of functions and determining their approximate value. Is able to calculate basic parameters of a random variable.</p> <p>Works unassisted with large amounts of information, recognizes relations and correctly draws conclusions using the principles of logic. Is set to the best execution of the task. He knows and restricts the rules and standards of being a chemist. Develops the ability to think logically.</p>	<p>lecture, informative (conventional)</p> <p>Exercises: independent work of graduates</p> <p>Laboratory: independent graduate work; experiment method; methods with the use of a computer</p>	<p>conscientiousness, theoretical preparation for classes, manual proficiency, knowledge and respecting safety regulations); Written tests; short tests; evaluation of individual exercise reports; final test; written exam</p>
	Health and safety training and ergonomics			
	Fundamentals of analytical chemistry			
	Physics			
	Physical chemistry			
	Fundamentals of quantum chemistry			
	Organic chemistry			
	Inorganic chemistry			
Major course module II	Instrumental analysis	<p>Acquires knowledge of theoretical and practical aspects of the implementation of the familiar qualitative and quantitative analysis of instrumental methods and principles of operation of the apparatus. Knows the</p>	<p>Lecture: introductory method - problematic lecture, informative</p>	<p>written or oral exam credit - final test for assessment, preparation of the project for assessment,</p>
	Environmental chemistry and ecology			
	Applied and materials			

	<p>chemistry</p> <p>Chemical technology and engineering</p> <p>Fundamentals of chemistry of biological processes and bioanalytcs</p>	<p>techniques of sample collection and preparation for analysis of environmental matrices, indicators of water quality, toxicity tests, methods of waste neutralization. Knows the basic aspects of construction of the materials and chemicals and methods of determine their properties. Knows how to use the materials for a particular purpose and knows practical indications of their management methods after usage. Has knowledge of the basics of the technology and chemical engineering It can collect environmental samples and perform quantitative analyzes using instrumental methods based on analytical procedures. Can prepare reports. Can find the relationship between behavior of the material during its formation and use and its physicochemical properties, composition and type of structure. Is able to solve problems related to the implementation processes. It is set to the best execution of the task. He knows and restricts the regulations and standards of being a chemist, including ethical standards; understand the social role of the profession; understands and appreciates the importance of intellectual honesty, attention to health and the environment in his/her own and other people activities. Establishes and maintains long-term and effective cooperation with others; seeks to achieve team goals through proper planning and organization of teamwork; motivates employees to the effort in order to achieve his/her objectives.</p>	<p>(conventional)</p> <p>Exercises: independent work of graduates</p> <p>Laboratory: independent graduate work; experiment method</p>	<p>preparation paper</p> <p>The continuous assessment determined by the lecturers (commitment, diligence, theoretical preparation for classes, manual proficiency, knowledge and compliance with health and safety regulations); written tests of "tickets"; assessment of individual reports on the exercises performed; final colloquium</p>
Course module III diploma work	<p>Seminar</p> <p>Diploma laboratory</p> <p>Diploma project</p>	<p>Knows the basic properties of inorganic and organic compounds, the types of reactions and their mechanisms. Has specialized knowledge in the field of chemistry and can use it during a presentation at a seminar and writing the thesis. Knows the rules of health and safety enough to work unassisted on a test or measurement. Thinks creatively to improve existing solutions. Fully independently carries out agreed objectives, taking sometimes difficult decisions. Can independently search for and critically evaluate information in the literature</p>	<p>Seminar: discussion, preparation of the paper</p> <p>Laboratory: independent graduate work; experiment method</p>	<p>Diploma exam, Credit</p> <p>The continuous assessment determined by the lecturers (commitment, diligence, theoretical preparation for classes, manual proficiency, knowledge and compliance with health and safety regulations); presentation of results</p>
Course module IV	General chemistry –	Has knowledge of basic chemistry. Can perform basic	Lecture: introductory	written or oral exam

general chemistry	basic level	laboratory operations and measurements. Is able to analyses and estimate the results of experiments. Can plan a simple chemical experiment and choose the equipment necessary for its implementation. He knows and restricts the regulations and standards of being a chemist, including ethical standards; understand the social role of the profession; understands and appreciates the importance of intellectual honesty, attention to health and the environment in his/her own and other people activities	method - problematic lecture, informative (conventional) Exercises: independent work of graduates Laboratory: independent graduate work; experiment method	credit - final test for assessment The continuous assessment determined by the lecturers (commitment, diligence, theoretical preparation for classes, manual proficiency, knowledge and compliance with health and safety regulations); written tests of "tickets"; assessment of individual reports on the exercises performed; final colloquium
	General chemistry – advanced level			
Elective course module V	Course related to chemistry studies (to be chosen from the available list)	Acquires additional chemical knowledge. He meets new analytical methods and the interpretation of research results and methods. Acquires the binding ability of the chemical properties of the chemical structure. Has an extended knowledge of basic chemistry departments, its development and importance for the progress of science and the knowledge of the world and of human development. Has in-depth knowledge in his/her chosen field of chemistry. Can apply modern analytical apparatus. Can use the extended knowledge of the fundamental branches of chemistry and use it creatively in terms of his/her speciality. Knows the limitations of his/her knowledge and understands the need to continue learning throughout life; can independently take action to broaden and deepen knowledge of chemistry. Can interact in a team (assuming there different roles) and creatively solve problems relating to research and chemical synthesis. Is able to prioritize appropriately to solve chemical problems. Is aware of professionalism, appreciation of intellectual honesty and respect for professional ethics, both in his own activities and others. Is able to formulate and present	Lecture: introductory method - problematic lecture, informative (conventional) Exercises: independent work of graduates Laboratory: independent graduate work; experiment method	written or oral exam credit - final test for assessment The continuous assessment determined by the lecturers (commitment, diligence, theoretical preparation for classes, manual proficiency, knowledge and compliance with health and safety regulations); written tests of "tickets"; assessment of individual reports on the exercises performed; final colloquium Credit without assessment
	Blocks of items to choose from			
	Physical Education			

		opinions on the fundamental chemical issues and developments in this discipline. Has knowledge of physical culture and knows how to lead health-promoting lifestyle. Promotes the sport and pursue his/her own preferences in the field of physical culture.		
Elective course module VI, e.g., university-wide courses or courses included in another field of study	Bioethics or Philosophy of Nature	Acquires general knowledge from other fields and disciplines, including the humanities. Takes skill of directing his/her own learning and interdisciplinary interests. Is set to the constant acquisition of new knowledge, sees the limitations of his/her knowledge and understands the need for continuous learning. Nabiera umiejętności samodzielnego kierowania własnym rozwojem intelektualnym i zainteresowaniami interdyscyplinarnymi. Achieves B2 reference level	Lecture: introductory method - problematic, informative (conventional) lecture. Exercises: Cognitive and communication method using various techniques, media, authentic materials	Determined by lecturers, pass mark or exam written or oral exam The continuous assessment determined by the lecturers (commitment, diligence, preparation for classes)
	University-wide courses			
	English in chemistry			
Course module VII Internships	Internships	Acquires knowledge about the functioning of various branches of the chemical industry and related (food, cosmetics, pharmaceuticals etc.) and meets the practical aspects of technological processes. Can bind the research process and analytical technology practice. He works steadily and has a positive approach to the difficulties standing in the way of the objective pursued; miss deadlines; understands the need for systematic work on all projects.	Laboratory: experiment method	Assessment basing on the practice register
Internships				
Duration of internships	120 hours			
Form of internships	laboratory work			
Rules of internships	rules of internship are set out in the internship regulations			
Detailed allocation of ECTS credits				
Academic or artistic disciplines, to which learning outcomes refer:				
	Artistic or academic discipline		ECTS credits	
			number	%
1.	Chemical sciences		180	100

Course modules	Course	No of ECTS credits	No of ECTS credits in the discipline: (enter names of disciplines)****					No of ECTS credits for	No of ECTS credits obtained by the graduate in classes conducted with the direct contact with the teacher or tutor	No of ECTS credits obtained by the graduate as a result of: courses related to academic activity within a discipline or disciplines, to which the field of study is assigned *****/ courses focused on training practical skills
			chemical sciences	physical sciences	mathematics	philosophy, linguistics	other			
Course module I basic subject	Informatics in chemistry (+ USOS)	6	6					2,8	6	
	Mathematics	12		12				5,2		
	Health and safety training and ergonomics	1	1					0,4		
	Fundamentals of analytical chemistry	12	12					6,6	12	
	Physics	6		6				3		
	Physical chemistry	19	19					9,4	19	
	Fundamentals of quantum chemistry	5	5					3	5	
	Organic chemistry	15	15					9,4	15	
	Inorganic chemistry	12	12					10,2	12	
Major course module II	Instrumental analysis	8	8					5,6	8	
	Environmental chemistry and ecology	7	7					3,2	7	
	Applied and materials chemistry	2	2					1,2	2	
	Chemical technology and engineering	3	3					1,6	3	
	Fundamentals of chemistry of biological processes and bioanalytics	4	4					2,6	4	
Course module III	Seminar	1	1				1	0,8	1	

diploma work	Diploma laboratory	6	6					6	3	6
	Diploma project	7	7					7	7	7
Course module IV general chemistry	General chemistry – basic level	16-17	16-17					16-17	8,2-9	16-17
	General chemistry – advanced level									
Elective course module V	Course related to chemistry studies (to be chosen from the available list)	2	2					2	1,2	2
	Blocks of items to choose from	18	18					18	9	18
	Physical Education									
Elective course module VI, e.g., university-wide courses or courses included in another field of study	Bioethics or Philosophy of Nature	4				4		4	1,2	
	University-wide courses	2-3					2-3	2-3		
	English in chemistry	7				7			4,8	
Course module VII Internships	Internships	4	4					4		4
RAZEM:			180	6/180	12/180	11/180	2-3/180	60/180	97,4/180	147/180
			100%	3,3%	6,7%	6,1%	1,1- 1,7%	33,3-%	54,1%	81,7%

* the description of a course syllabus is attached to the study programme

This study programme is effective as of I semester of the academic year 2019/2020.