Study programme

General description of the study	
Faculty leading the study:	Faculty of Chemistry
Study:	Chemistry
Type of studies:	First cycle studies (BSc)
Education profile:	Academic
Location of the course in field(s) of education:	X –field of education related to exact sciences
System of studies	Full-time studies
Number of semesters:	6
Number of ECTS credit points required to achieve a qualification equivalent to the study level	180
Total number of teaching hours:	2228
Professional title obtained by the graduate:	BSc
Specialities:	Biomedical chemistry; Food chemistry and analysis; Computational chemistry; Chemistry of cosmetics; Inorganic chemistry in the human life; Environmental chemistry; Chemistry of polymers; Nanomaterials and nanostructures; General chemistry
General objectives of education and employment opportunities and continuing education for graduates:	The course of chemistry offers first degree study based on the elements of mathematics and natural sciences combining knowledge of basic chemistry, analytical chemistry,

	physical, organic, inorganic, quantum chemistry , chemistry of materials, environmental chemistry and ecology and technology and chemical engineering. Undergraduate students acquire theoretical and practical knowledge in the field of preparation, analysis, characterization and safe use of chemicals and waste disposal. They learn the basics of safety and efficacy of working with chemical reagents, chemical, physical and biological phenomena and processes taking place in nature and technological rules and schemes. Chemistry Graduates will be prepared for teamwork in the chemical and allied industries (food, pharmaceutical, cosmetic, etc.), small manufacturing, government and education - after completing teaching specialty (according to the standards of education in preparation for the teaching profession). After acquiring practical knowledge and experimental training graduate students can solve problems, store, process and transmit information in the form of written or oral. Graduates will be prepared to continue education in master degree studies, especially focused on chemistry.
The relationship of the training program with the mission and strategy of the Nicolaus Copernicus University	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. According to the strategy of Nicolaus Copernicus University the teachers and students work are evaluated and self-estimated, measure of which is reliability, high quality and a deep commitment to the universal ethical values.
Indication of whether the in the process of defining learning outcomes, and in the preparation and	In the process of defining learning outcomes, and in the preparation and improvement of the study programme opinions of stakeholders, in particular students of chemistry degree

improvement of the study program opinions of stakeholders, in particular students, graduates, employers were included:	and graduate chemistry were included.
Admission requirements (expected competence of the candidate)	none

Teaching modules, with the intended learning outcomes

Teaching module	Subjects	Number of ECTS credits	Type of course	Learning field	Intended learning outcomes	Methods of verification of learning outcomes achieved by students
MK_1 - Main subjects	Informatics in chemistry (+ USOS)	6	compulsory	X	Has knowledge of the foundations of analytical, physical, organic, inorganic, quantum chemistry and biochemistry. 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. Knows the basic rules of safety and health at	Continuous assessment (involvement of 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
	Health and safety training and ergonomics	1	compulsory	X		

	Fundamentals of analytical chemistry	12	compulsory	X	work in chemistry. 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. 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. 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.	
	Physics	6	compulsory	X		
	Physical chemistry	8+10	compulsory	X		
	Introductory quantum chemistry	5	compulsory	X		
	Organic chemistry	4+10	compulsory	X		
	Biochemistry	4	compulsory	X		
	Inorganic chemistry	2+10	compulsory	X		
	Instrumental analysis	3+5	compulsory	X	Acquires knowledge of theoretical and practical aspects of the implementation	Continuous assessment

MK_2 - Major subjects	Environmental chemistry and ecology	7	compulsory	X	of the familiar qualitative and quantitative analysis of instrumental methods and principles of operation of the apparatus. Knows the 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 behaviour of the material during its formation and use and its	(involvement of 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
	Applied and materials chemistry	2	compulsory	X		
	Chemical technology and engineering	3	compulsory	X		

					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.	

MK_3 **Diploma work**	Diploma seminar	1	compulsory/ optional	X	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.	Continuous assessment (involvement of 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 Evaluation of submitted papers and discussions at the seminar. The diploma examination.
	Diploma thesis	9	compulsory /optional	X		

MK_4A- **General chemistry – basic level**	General chemistry – basic level	16	compulsory-optional level	X	Has knowledge of basic chemistry. Can perform basic laboratory operations and measurements. Is able to analyse and estimate the results of experiments. 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.	Evaluation of preparation for classes, manual proficiency; final test; written exam

MK_4B- **General chemistry – extended level**	General chemistry – advanced level	17			Has knowledge of basic chemistry. Can perform basic laboratory operations and measurements. Is able to analyse 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.	

MK_5A-Mathematics – basic level	Mathematics – basic level	5+6	compulsory – optional level	X	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), 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. Is set to the best execution of the task. Develops the ability to think logically.	Continuous evaluation; final test, written exam

MK_5B- Mathematics – extended level	Mathematics – advanced level	6+7			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), using the tools of mathematical analysis to the study of functions and determining their approximate value. Is able to calculate basic parameters of a random variable. Is set to the best execution of the task. Develops the ability to think logically.	
MK_6- General university courses	General university courses	5-8	compulsory/ optional	X, P, H, S	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.	Assessment or examination
MK_7 – Course	Course related to	2	compulsory/	X	Acquires additional chemical knowledge.	Assessment or

related to chemistry studies (to be chosen from the available list)	chemistry studies (to be chosen from the available list)		optional		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 and its structure. Can apply modern analytical apparatus. It is set to the constant acquisition of new knowledge, skills and experience; sees the need for continuous improvement and raise the professional competence.	examination
MK_8- Courses related to the chosen specialty	**Specialities:** 1. Biomedical chemistry(**12**) 2. Computational chemistry(**12**) 3. Food chemistry and analysis(**12**) 4. Chemistry of cosmetics(**12**) 5. Inorganic chemistry in the human life (**12**) 6. Environmental chemistry (**12**) 7. Chemistry of polymers (**12**) 8. Nanomaterials and nanostructures (**12**) 9. General chemistry **Optional subjects blocks:** 1. Environmental engineering (**6**)	12+12	compulsory/ optional	X	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 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.	Continuous assessment (involvement of conscientiousness, theoretical preparation for classes, manual proficiency, teamwork, knowledge and respecting safety regulations); Written tests; short tests; evaluation of individual exercise reports

	2. Fundamentals of photochemistry (**6**) 3. Sensors and sensory reception of volatile substances (**6**) 4. Spectroscopic methods in analytical chemistry (**6**) 5. Computer simulations in chemistry (**6**) 6. Fundamentals of separation methods (**6**) 7. Biomedical chemistry – selected topics (**6**)				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 opinions on the fundamental chemical issues and developments in this discipline.	
MK_9 – Physical education	Physical education	1+1	compulsory/ optional	M	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.	Assessment
MK_10 – English language	English language	2+3	compulsory	H	Achieves B2 reference level	Oral or written examination
MK_11 – Internship	Internship – 120 hours	4	compulsory/ optional	X, P	Acquires knowledge about the functioning of various branches of the chemical industry and related (food, cosmetics, pharmaceuticals etc.) and meets the practical aspects of	Assessment basing on the practice register

					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.	

Detailed indicators of calculating ECTS credit points*

Teaching modules	Subjects	Number of ECTS credits, which are awarded for activities that require direct participation of teachers	Number of ECTS credits, which are awarded in courses of a practical nature, including laboratory classes and projects	Number of credits that a student must obtain in courses of basic sciences, to which the learning outcomes for a particular course, level and profile of education relate
MK_1 –Main subjects	Informatics in chemistry (+ USOS)	**2,4**	**1,8**	**6**
	Occupational safety, health and ergonomics	**0,32**		**1**
	Fundamentals of analytical chemistry	**5,4**	**4,2**	**12**
	Physics	**3**	**1,8**	**6**
	Physical chemistry	**8,4**	**5,4**	**18**

	Introductory quantum chemistry	**2,4**	**1,4**	**5**
	Organic chemistry	**8,4**	**5,4**	**14**
	Biochemistry	**2,4**	**1,2**	**4**
	Inorganic chemistry	**7,2**	**4,8**	**12**
MK_2 –Major subjects	Instrumental analysis	**4,8**	**3,6**	**8**
	Environmental chemistry and ecology	**3**	**2,4**	**7**
	Applied and materials chemistry	**1,2**		**2**
	Chemical technology and chemical engineering	**1,8**	**1,2**	**3**
MK_3 – Diploma work	Diploma seminar	**0,6**		**1**
	Diploma thesis			**9**
MK_4A- **General chemistry - basic level**	General chemistry – basic level	**7,8**	**6**	**16**
MK_4B- **General chemistry – extended level**	General chemistry – advanced level	**8,4**	**6,6**	**17**

MK_5A- Mathematics – basic level	Mathematics – basic level	**4,8**	**3,6**	**11**
MK_5B- Mathematics – extended level	Mathematics – advanced level	**4,8**	**3,6**	**13**
MK_6- General university courses	General university courses	**2,4**		**5-8**
MK_7 – Course related to chemistry studies (to be chosen from the available list)	Course related to chemistry studies (to be chosen from the available list)	**1,2**		**2**
MK_8- Courses related to the chosen specialty	Courses related to the chosen specialty	**14,4**	**9,6**	**24**
MK_9 – Physical education	Physical education	**2**		**2**
MK_10 – English language	English language	**4,8**	**4,8**	**5**
MK_11 - Internship	Internship		**4**	**4**
	Total:	**101,92**	**71.4**	**180**

% of the number of credits that the student obtains as a result of selection of training modules:	**42,78% (77 ECTS)** - 0600-S1-O-PCGeneral chemistry - basic level – 16 ECTS - 0600-S1-O-PC.R General chemistry - advanced level – 17 ECTS - 0600-S1-O-MAT Mathematics – basic level – 11 ECTS - 0600-S1-O-MAT.R Mathematics – advanced level – 13 ECTS - 0000-OG General university courses – 5-8 ECTS - 0600-S1-SP/W Course related to chemistry studies – 2 ECTS - 0600-S1-Spec- Courses related to the chosen specialty – 24 ECTS - 4200- Physical education – 2 ECTS - 0600-S1-O-PZ Internship – 4 ECTS Diploma seminar – 1 ECTS Diploma thesis – 9 ECTS

*Number of credits earned - in accordance with the program of studies - by the student for course credit is not the sum of columns: "Number of ECTS credits, which are awarded in classes that require direct participation of academics", "Number of ECTS credits, which are awarded in the framework of activities of an practice, including laboratory classes and project "," Number of ECTS credits that a student must obtain in courses of basic sciences, to which the learning outcomes for a particular direction, the level and profile of education. "

for example, the subject of "X" - provided in the curriculum as a laboratory for 30 hours, for credit which the student obtains 2 ECTS credits should be written out:

- In the column "Number of ECTS credits, which are awarded for activities that require direct participation of teachers" - 1 ECTS;
- In the column "Number of ECTS credits, which are awarded in the context of practical activities, including laboratory classes and project" - 2 ECTS;
- In the column "Number of credits that a student must obtain in courses of basic sciences, to which the learning outcomes for a particular direction, the level and profile of education" - 2 ECTS.