

**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:		second-cycle studies
Level of the Polish Qualifications Framework:		level 7
Degree profile:		general academic
Professional degree awarded to the graduate:		magister
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 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 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, 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 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.

*Part B) of the study programme*

**Description of the process resulting in the achievement of learning outcomes**

<b>Faculty offering the field of study:</b>	Faculty of Chemistry
<b>Field of study:</b>	chemistry
<b>Level of study:</b>	second cycle
<b>Level of the Polish Qualifications Framework:</b>	level 7
<b>Degree profile:</b>	general academic
<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>	Discipline: chemical sciences (100%) <b>Major discipline:</b> chemical sciences
<b>Mode of study:</b>	full-time programme
<b>Number of semesters:</b>	4
<b>Number of ECTS required for the award of qualifications corresponding to the level:</b>	120
<b>Total number of teaching hours:</b>	1020
<b>Professional degree awarded to the graduate:</b>	magister
<b>The relationship between the study programme and NCU mission and strategy:</b>	<p>Prosperity and development of modern society requires the use and continuous development of advanced technology. The need to train highly specialized chemists is therefore one of the conditions for maintaining the current status of our society. That condition requires high skills gained in their studies of chemical secondary education. In this context, the program of Chemistry is perfectly in keeping with the mission of the Nicolaus Copernicus University in Torun, assuming the implementation of the basic objective is to develop and disseminate knowledge by teaching at an academic level corresponding to the content of the current and future needs and aspiration of society.</p> <p>The study program fits well with the strategy of UMK assuming that "the university will focus its efforts on achieving the highest level of teaching full-time second and third degree."</p>

**Courses/course modules along with expected learning outcomes \***

<b>Course module</b>	<b>Course</b>	<b>Expected learning outcomes</b>	<b>Forms and methods of teaching ensuring the achievement of learning outcomes ....</b>	<b>Methods of verifying and assessing expected learning outcomes achieved by the student</b>
<b>Course module Basic</b>	Theoretical chemistry	Student upon the graduation with a M.Sc. degree: has theoretical and practical knowledge of modern methods	Lecture: introductory method - problematic lecture,	Continuous assessment (involvement of theoretical

	Transition Metal Chemistry and Magnetochemistry	<p>of bioactive substances synthesis and identification; Knows theoretical fundamentals of quantum chemistry computational methods; Knows correlations between the results obtained by theoretical computations and various experimental techniques. Has general knowledge of transition metals chemistry, its development trends and recent findings. Knows and understands theoretical fundamentals of various analytical methods and their application to the interpretation of measurement results. Knows advanced techniques applied in chemical processes;</p> <p>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;</p> <p>Is able to specify scientific problems in chemistry, to search for solutions, to present the results of work in the form of written reports as well as an individually prepared project.</p>	<p>informative (conventional)</p> <p>Laboratory: independent student work; experiment method; methods programmed with the use of a computer</p>	<p>preparation for classes, manual proficiency, knowledge and respecting safety regulations); Written tests; short tests; evaluation of individual exercise reports; final test; written exam</p>
	Solid and Surface Chemistry			
	Advanced Instrumental Analysis			
	Chemical Technology			
	Hyphenated Separation Techniques			
<b>Course module Directional</b>	Molecular Spectroscopy	<p>Student upon the graduation with a M.Sc. degree: 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; 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; Knows and understands theoretical fundamentals of analytical methods and their application to the interpretation of measurement results.</p> <p>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;</p> <p>Is able to specify scientific problems in chemistry, to search for solutions, to present the results of work in the form of written reports as well as an individually</p>	<p>Lecture: introductory method - problematic lecture, informative (conventional)</p> <p>Laboratory: independent student work; experiment method; methods programmed with the use of a computer</p>	<p>Continuous assessment (involvement of 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>
	Physical Chemistry of Materials			
	Natural and Synthetic Organic Materials			
	Crystallochemistry			
	Physicochemistry of Polymers			
	Nanochemistry and Nanomaterials			

		prepared project.		
<b>Course module optional</b>	Pharmaceutical and Cosmetic Materials	Has in-depth knowledge of a selected branch of chemistry; Knows advanced techniques applied in chemical processes; Is able to prepare and present papers as well as conduct content-related discussions with specialists.	Lecture: introductory method - problematic lecture, informative (conventional)  Laboratory: independent student work; experiment method; methods programmed with the use of a computer	Continuous assessment (involvement of theoretical preparation for classes, manual proficiency, knowledge and respecting safety regulations); Written tests; short tests; evaluation of individual exercise reports; final test; written exam
	Membrane Processes in Chemical Technology			
	Materials in Coordination Chemistry			
	Adsorbents and Catalysts			
<b>Practical</b>	Conductive and Photosensible Polymer Materials	Has in-depth knowledge of a selected branch of chemistry; Knows advanced techniques applied in chemical processes; Is able to prepare and present papers as well as conduct content-related discussions with specialists.	Lecture: introductory method - problematic lecture, informative (conventional)  Laboratory: independent student work; experiment method; methods programmed with the use of a computer	Continuous assessment (involvement of theoretical preparation for classes, manual proficiency, knowledge and respecting safety regulations); Written tests; short tests; evaluation of individual exercise reports; final test; written exam
	Organometallic and Bioinorganic Materials			
	Carbon Materials Preparation and Properties			
<b>Foreign language classes</b>	English in Chemistry II	Has knowledge about the connections between chemistry and other areas of knowledge, necessary for the implementation of the diploma thesis Can use English at intermediate level, I use this knowledge during my studies while studying and preparing my diploma thesis. He works alone and in a team, he is responsible for the tasks related to team work	Exercises: Cognitive and communication method using various techniques, media, authentic materials and varied forms of student work with an emphasis on academic discourse including: discussion, text analysis, data interpretation and presentation of work results	written exam (oral) or oral exam  The continuous assessment determined by the lecturers (commitment, diligence, preparation for classes)
<b>Elective course</b>	University-wide	He acquires general knowledge from other fields and	Lecture: introductory method	Determined by lecturers,

module	courses	scientific disciplines, eg humanistic. Acquires the ability to independently manage their own intellectual development and interdisciplinary interests. He is focused on constantly acquiring new knowledge, he sees limitations of his own knowledge and understands the need for continuous education.	- problematic lecture, informative (conventional)	graded credit or exam
Diploma project and/ or diploma examination ***	Seminar	Is able to find information in scientific journals and popular science magazines as well as chemical databases; Is able to design and perform an experiment as well as analyse its results critically; Is aware of his/her level of knowledge and understands the need for lifelong learning. Is able to undertake actions to extend and deepen the knowledge of chemistry; 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. Has sufficient knowledge of occupational health and safety regulations that allows to work independently and perform unsupervised research or measurement-related work; Can formulate and present opinions on fundamental chemical issues and developments in this area	Laboratory: independent student work; experiment method Seminar: student presentations, discussion diploma exam	The continuous assessment determined by the lecturers (commitment, diligence, theoretical preparation for classes, manual proficiency, knowledge and compliance with health and safety regulations); oral diploma exam
	Diploma laboratory* individual			
Detailed allocation of ECTS credits				
Academic or artistic disciplines, to which learning outcomes refer:				
	Artistic or academic discipline		ECTS credits	
			number	%
1.	Chemical science		120	100

Course modules	Course	No of ECTS credits	No of ECTS credits in the discipline: (enter names of disciplines)****			No of ECTS credits for elective courses	No of ECTS credits obtained by the student in classes conducted with direct contact with the teacher or tutor	No of ECTS credits obtained by the student 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 science	linguistics	other			
Course module Basic	Theoretical chemistry	6	6				2,8	6
	Transition Metal Chemistry and Magnetochemistry	6	6				2,8	6
	Solid and Surface Chemistry	6	6				2,8	6
	Advanced Instrumental Analysis	6	6				2,8	6
	Chemical Technology	6	6				2,8	6
	Hyphenated Separation Techniques	6	6				2,8	6
Course module Directional	Molecular Spectroscopy	6	6				2,8	6
	Physical Chemistry of Materials	6	6				2,8	6
	Natural and Synthetic Organic Materials	6	6				2,8	6
	Crystallochemistry	6	6				2,8	6
	Physicochemistry of Polymers	6	6				2,8	6
	Nanochemistry and	6	6				2,8	6



	Nanomaterials							
Course module optional	Pharmaceutical and Cosmetic Materials	6	6			6	2,8	6
	Membrane Processes in Chemical Technology							
	Materials in Coordination Chemistry	6	6			6	2,8	6
	Adsorbents and Catalysts							
	Course module practice	Conductive and Photosensible Polymer Materials	4	4			4	2,8
Organometallic and Bioinorganic Materials								
Carbon Materials Preparation and Properties								
Foreign language classes	English in chemistry II	3		3			1,8	
Elective course module	University-wide courses	2			2			
Diploma project and/or diploma examination ***	Seminar	2	2			2	1,2	2
	Diploma laboratory* - individual	25	25			25	16	25
IN TOTAL:	120		115	3	2	43	61	115
	100%		95,8%	2,5%	1,7%	35,8%	50,8%	95,8%
	120 100%							

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

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