

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

Faculty offering the field of study:		Faculty of Chemistry NCU in Toruń Department of Chemistry NAUKMA Kyiv
Field of study:		Modern Materials for Chemistry and Medicinal Applications
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 chemistry as the theoretical basis for learning in the field of modern materials; knows the main development trends related with the application of chemical methods in medicine, pharmacy and material chemistry.	
K_W02	The graduate knows and understands both positive and negative aspects associated with the synthesis and technology of modern materials, including copyright protection.	
K_W03	The graduate knows and understands in depth analytical methods and instrumental measurement techniques used in medicine, pharmacy and material chemistry, and their importance for the progress of sciences and natural sciences, knowledge of the world and human development.	
K_W04	The graduate knows current development trends and the state-of-the-art achievements related to modern materials.	
K_W05	The graduate knows and understands ethical circumstances, risks and responsibility associated with modern materials research.	
SKILLS		
K_U01	The graduate can use the knowledge related to modern materials in chemistry, medicine, and pharmacy, properly choose analytical and instrumental methods used in the synthesis of novel materials, can select and assess appropriate methods of extraction, isolation, purification, and characterization of molecules.	
K_U02	The graduate can discuss topics related to modern materials during the studies and during the development of the diploma thesis. The graduate can prepare reports related to results of their work in English, uses English communicatively at the B2+ level in the field of modern materials.	
K_U03	The graduate can work on their own and as a team member, can implement and expand knowledge of chemical methods used in medical and material research and solve problems based on the acquired knowledge of issues in the field of modern materials.	
K_U04	The graduate is able to carry out research tasks in the field of materials and medicinal chemistry, to critically evaluate the results of analyses, to discuss measurement errors and to apply appropriate software packages for the statistical analysis of an experiment.	
K_U05	The graduate can use the acquired knowledge in the field of modern materials in related fields and scientific disciplines.	

K_U06	The graduate is able to propose biologically active compounds and materials for use in medicine and pharmacy, to select the optimal conditions for their preparation and to propose methods of their analysis, taking into account environmental aspects and the principles of occupational health and safety.
K_U07	The graduate can handle properly chemicals in the lab and is aware of the rules of good laboratory practice (GLP). Can integrate information and propose approaches for the monitoring and design of medicinal agents from different sources.
K_U08	The graduate is able to use their knowledge about functional groups and structure-activity relationships to predict the physical and chemical properties of the materials and biologically active compounds.
SOCIAL COMPETENCES	
K_K01	The graduate is able to formulate and present opinions on problems related to new materials in chemistry, medicine and pharmacy, and is aware of the importance of acquired knowledge in academic and professional work.
K_K02	The graduate understands ethical and social aspects of the practical use of acquired knowledge and skills.
K_K03	The graduate is able to share their knowledge and justify the importance of the development of chemical sciences in medical and material terms.

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 NCU in Toruń Department of Chemistry NAUKMA in Kyiv
Field of study:	Modern Materials for Chemistry and Medicinal Applications
Level of study:	second-cycle
Level of the Polish Qualifications Framework:	level 7
Degree profile:	general academic
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:	4
Number of ECTS required for the award of qualifications corresponding to the level:	120
Total number of teaching hours:	950 + university-wide courses
Professional degree awarded to the graduate:	magister
The relationship between the study programme and NCU mission and strategy:	The study program "Modern materials for chemistry and medicinal applications" is closely related to the mission of the Nicolaus Copernicus University, i.e. developing and disseminating the knowledge. Scientific research related to medicine and pharmacy has been conducted at the Faculty of Chemistry, and the results of these studies have been disseminated in the form of highly ranked worldwide scientific publications. Teaching is conducted at the high academic level. Other forms of education and popularization, corresponding to the current and future needs and aspirations of society are also carried out. According to the NCU strategy, the work and performance of academic teachers and students are subject to permanent evaluation and self-assessment, measured by their reliability, high quality and the deep commitment to universal ethical values. NaUKMA was the first Ukrainian university which introduced 2-cycle

	studies. One of the strategic priorities of NaUKMA is the fast development of the Faculty of Life Sciences, and consequently the Institute of Chemistry (ICh). In 2018 NaUKMA introduced regulations regarding the internal system of quality assurance of education and detailed recommendations for study programs, taking into account the interest of universities, students and employers. NaUKMA has over 10 years of experience in running joint study programs, in particular at the master's level: with the Friedrich Schiller University in Jena, with the University of Warsaw and the University of Vilnius. Moreover, NaUKMA actively implements a number of international educational and research projects.
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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 student
Course module I Basic NCU	Physicochemical methods for modern materials characterization	The student: - knows and is able to apply physicochemical methods for modern materials characterization - knows the structure and application of polymers or composite materials - knows theoretical fundamentals of separation techniques and nanomaterials	Lecture: giving method - problematic, informative (conventional) lecture Laboratory: independent work of students; experiment method; computer programmed methods	<i>Lecture:</i> written (test) or oral exam Pass - final test for evaluation, project preparation for evaluation, preparation paper <i>Laboratory:</i>
	Polymer and composite materials			
	Nanomaterials and Nanotechnologies in Medicine			

	Modern separation techniques	- is able to design and perform an experiment as well as analyse its results critically - is able to analyse selected types of spectra and draw conclusions with regard to the structure of compounds - student is able to cooperate with other persons and work in a team, as well as to creatively solve problems concerning study - is able to determine priorities in order to solve a chemical problem posed by him/herself or by other persons - is aware of his/her level of knowledge and understands the need for lifelong learning.		Continuous assessment determined by the teachers (commitment, diligence, theoretical preparation for classes, manual proficiency, knowledge and compliance with health and safety regulations); written checks of 'tickets'; assessment of individual reports from exercises performed; own and team tasks and projects, final test for evaluation
Course module II Basic NAUKMA	Sorption and adsorption	The student: - has knowledge of synthesis and characteristics of organic compounds and their practical use - has theoretical and practical knowledge of separation and purification membrane methods - knows theoretical and practical fundamentals of sorption and adsorption - is aware of potential practical implementation and economic importance of methodology of scientific research - knows correlations between the chemistry and pharmacy - knows and understands theoretical fundamentals of analytical methods, application to the interpretation of	Lecture: giving method - problematic, informative (conventional) lecture	<i>Lecture:</i> written (test) or oral exam Pass - final test for evaluation, project preparation for evaluation, preparation paper <i>Laboratory, Practice:</i> Continuous assessment determined by the teachers (commitment, diligence, theoretical preparation for classes, manual proficiency, knowledge and compliance with health and safety regulations); written checks of
	Pharmaceutical chemistry		Laboratory or Practice: independent work of students; experiment method; computer programmed methods	
	Organic synthesis in early drug discovery			
	Methodology of scientific research in chemistry			

	Purification and separation of substances by membrane methods	measurement results - is able to undertake actions to extend and deepen the knowledge of chemistry - knows legal, economic, environmental and social aspects connected with the production of chemicals - is aware of their responsibility for research and experiments undertaken - acquires the ability of self-control of their own learning and interdisciplinary interests; Is focused on continuous acquiring new knowledge, he sees the limitations of their knowledge and understands the need for continuous learning.		'tickets'; assessment of individual reports from exercises performed; own and team tasks and projects, final test for evaluation
Course module III Optional NCU	Metal complexes in medicine and modern personalized implantology	The student: - 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 - has in-depth knowledge of: metal complexes, drugs synthesis and technology, free radicals, active substances - is able to take advantage of extended knowledge covering chemistry and use it creatively within the range of his/her specialization - is able to undertake actions to extend and deepen the knowledge of chemistry. - is able to work in a team, as well as to creatively solve problems concerning research studies - can formulate and present opinions on chemical issues and developments in this area	Lecture: introductory method - problematic, informative (conventional) lecture Laboratory: independent student work; experiment method; computer programmed methods	<i>Lecture:</i> written (test) or oral exam Pass - final test for evaluation, project preparation for evaluation, preparation paper <i>Laboratory:</i> Continuous assessment determined by the teachers (commitment, diligence, theoretical preparation for classes, manual proficiency, knowledge and compliance with health and safety regulations); written checks of 'tickets'; assessment of individual reports from exercises performed; own and team tasks and projects, final test for evaluation
	Materials and methods in natural drugs technology			
	From natural resources to free radicals			
	Structural basis for the activity of active substances			
	Drug synthesis and pharmaceutical form			
Course module IV Optional NAUKMA	Fundamentals of product and project management	The student: - has in-depth knowledge of a selected branch	Lecture: introductory method - problematic, informative (conventional) lecture	<i>Lecture:</i> written (test) or oral exam Pass - final test for evaluation,
	Cell and tissue engineering in			

	the creation of new biological materials	of chemistry and materials science - has an understanding of product and project management; knows and applies advanced techniques in development and characterization of advanced chemical and biological materials for medicine, pharmacy and chemistry of materials - is able to specify scientific problems in chemistry - is able to prepare and present papers as well as conduct content-related discussions with specialists	Laboratory: independent student work; experiment method; computer programmed methods	project preparation for evaluation, preparation paper <i>Laboratory, Practise:</i> Continuous assessment determined by the teachers (commitment, diligence, theoretical preparation for classes, manual proficiency, knowledge and compliance with health and safety regulations); written checks of 'tickets'; assessment of individual reports from exercises performed; own and team tasks and projects, final test for evaluation
	Organic functional materials			
	Nanotechnology in pharmacology			
	Modern drug delivery systems			
Course module V Elective course module, e.g., university-wide courses or courses included in another field of study that are unrelated to a specific field of study	Social and Technical Innovations	The student: - acquires knowledge of other areas and disciplines, eg. humanities and economics - has knowledge of social and technical innovations: the history of inventions, their concept and implementation - has knowledge of patenting inventions in Poland, Europe and the World - acquires the ability of self-control of their own learning and interdisciplinary interests; Is focused on continuous acquiring new knowledge, he sees the limitations of their knowledge and understands the need for continuous learning - develops the skills of creative thinking in conjunction with the ability to formulate a social or technical problem and concept of solution.	Lecture: introductory method - problematic, informative (conventional) lecture Practice: feeding/problem method	<i>Lecture:</i> written (test) or oral exam credit - final test for grade, project preparation for grade, paper preparation <i>Practice:</i> continuous assessment determined by the lecturers, assessment of projects
	University-wide courses			

Course module VI Foreign language classes	English in chemistry II	The student: - knows of the relationship of medical chemistry with other areas of knowledge, necessary for the implementation of the diploma thesis - can use English at an intermediate level, I use this knowledge during my studies while studying and preparing my diploma thesis. - works alone and in a team, is responsible for the tasks related to teamwork	Practice: Cognitive-communicative 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 effects	written (test) or oral exam Continuous assessment determined by the teachers (commitment, diligence, preparation for classes)
	English for public speaking and academic writing			
Course module VI Diploma project and/ or diploma examination ***	Diploma seminar	The student: - knows the principles of proper planning of experiment as well as the principles of occupational health and safety - has a solid understanding of experimental techniques and interpretation of results in the field, can apply theoretical knowledge and practical skills to a research project and on the collection and analysis of scientific data - can independently design and carry out an experiment - he/she can interpret, evaluate and collocate chemical information and data and compare his own findings with scientific literature - can present the results of his research, both orally and in writing at a level and style appropriate to the audience - completes a written description of the work in the form of a well-written, properly organized thesis; can form opinions on chemistry and achievements in this discipline	Seminar: giving method, problematic, discussion Laboratory - method of experiment	Activity during classes, evaluation of results presentation <i>Diploma exam:</i> oral exam in front of the examination board
	Diploma project			

Internships**							
Duration of internships	not applicable						
Form of internships	not applicable						
Rules of internships	not applicable						
Detailed allocation of ECTS credits							
Academic or artistic disciplines, to which learning outcomes refer:							
	Artistic or academic discipline		ECTS credits				
			number	%			
1.	chemical sciences		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 sciences	linguistics			

Course module I Basic NCU	Physicochemical methods for modern materials characterization	8	8					4	8
	Polymer and composite materials	7	7					3,8	7
	Nanomaterials and Nanotechnologies in Medicine	6	6					3,0	6
	Modern separation techniques	6	6					3,0	6
Course module II Basic NAUKMA	Sorption and adsorption	6	6					2,8	6
	Pharmaceutical chemistry	6	6					2,4	6
	Organic synthesis in early drug discovery	6	6					2,8	6
	Methodology of scientific research in chemistry	3	3					1,2	3
	Purification and separation of substances by membrane methods	6	6					2,4	6
Course module III Optional NCU	Metal complexes in medicine and modern personalized implantology	15	15				15	7,8	15
	Materials and methods in natural drugs technology								
	From natural resources to free radicals								
	Structural basis for the activity of active substances								
	Drug synthesis and pharmaceutical form								
Course module IV Optional NAUKMA	Fundamentals of product and project management	15	15				15	6	15
	Cell and tissue engineering in the creation of new biological materials								
	Organic functional materials								
	Nanotechnology in pharmacology								
	Modern drug delivery systems								

Elective course module, e.g., university-wide courses or courses included in another field of study that are unrelated to a specific field of study	Social and Technical Innovations	2			2			1,2	
	University-wide courses	5				5	5	2,4	
Foreign language classes	English in chemistry II	3		3				1,8	
	English for public speaking and academic writing	3		3				1,8	
Diploma project and/or diploma examination ***	Diploma seminar	3	3				3	2	3
	Diploma project	20	20				20	12	20
IN TOTAL:		120	107/120 89,2%	6/120 5%	2/120 1,6%	5/120 4,2%	58/120 48,3%	60,4/120 50,2%	107/120 89,2%
			107 100%						

* 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 2022/23.