MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE

TARAS SHEVCHENKO NATIONAL UNIVERSITY OF KYIV

«A P P R O V E»
Rector
_____ ***Leonid V. Huberskyi***

26.06.2018

EDUCATIONAL AND SCIENTIFIC PROGRAM

. « CHEMISTRY»

Level of higher education: the third

Educational degree: Doctor of Philosophy

Specialty : 102 "Chemistry"

Field of knowledge: 10 "Natural sciences"

Considered and approved at the
meeting of the Academic Council
on 25.06.2018
protocol № 12

Put into effect
by the order of the rector
on 25.07.2018 № 659-32

KYIV - 2018

INFORMATION ABOUT EXTERNAL APPROVAL

1. Deputy Director of the L.V. Pisarzhevsky Institute of Physical Chemistry of NAS of Ukraine, Dr. Sci. in Chemistry, Professor, Academician of the NAS of Ukraine Vitalyi V. Pavlishchuk

Conclusion – the educational and scientific program "Chemistry" meets all the requirements of the Ministry of Education and Science of Ukraine for the training of Doctors of Pilosophy and can be introduced into the educational process of the Faculty of Chemistry of Taras Shevchenko National University of Kyiv.

2. Chairman of the Scientific and Methodological Commission of the Faculty of Physics of the Taras Shevchenko National University of Kyiv, Dr. Sci., Professor Serhyi E. Zelensky

Conclusion – educational and scientific program in the specialty "Chemistry" is aimed at effective training of specialists of the highest level of qualification in chemistry. The faculty has a sufficient number of equipment and measuring instruments.

1. PROFILE OF THE EDUCATIONAL AND SCIENTIFIC PROGRAM

Chemistry

Specialty 102 «Chemistry»

1 - General information	
Degree of higher education and title of qualification	**The higher education degree – PhD** **Specialty – 102 Chemistry** **Program – Chemistry**
Teaching language	Ukrainian
The scope of the educational program	40 credits ECTS, 4 years
Program type	Educational and scientific
The full name of the institution of higher education and of a structural unit in which training is carried out	Faculty of Chemistry at Taras Shevchenko National University of Kyiv
Name of the higher education institution participating in the program	High Technology Institute at Taras Shevchenko National University of Kyiv
The official name of the educational program, the degree of higher education and the name of the qualification of the partner university in the original language	102 Chemistry PhD
Availability of accreditation	
Program cycle / level	NQF of Ukraine – Level 9, FQ-EHEA – the third cycle, EQF-LLL – level 8
Prerequisites	Masters diploma (the second cycle of higher education). On a competitive basis
Form of study	full-time, part-time
Term of the educational program	4 years
Internet address of the permanent post of the description of the educational program	www.chem.univ.kiev.ua
2 – The purpose of the educational program	
The purpose of the program (taking into account the level of qualification)	The purpose of ESP is to train a highly qualified, competitive specialist with the qualification of "Doctor of Philosophy in the field of natural sciences", who can perform independent research, carry out pedagogical, practical and organizational activities in the field of chemistry and related fields.
3 – Characteristics of the educational program	
Subject area (field of knowledge / specialty / program specialization)	10 natural sciences 102 Chemistry
Orientation of the educational	Educational and scientific

program	
The main focus of the educational program	Educational and scientific program (ESP) for training Doctors of Philosophy (PhD) in the field of Natural sciences, specialty 102 "Chemistry" is aimed at training of highly qualified specialists, who can effectively solve theoretical and experimental problems of modern chemistry, perform scientific research requiring a deep fundamental and interdisciplinary knowledge, skills to work on the latest research and technological equipment, skills of international scientific cooperation. Keywords: inorganic chemistry, organic chemistry, analytical chemistry, bioinorganic chemistry, physical chemistry, chemistry of macromolecular compounds, synthesis, chemical analysis of biological, pharmaceutical and ecological objects.
Features of the program	The program is implemented in small scientific groups involved in a wide range of experiments in the field of creating new substances and materials.
4 – Suitability of graduates for employment and further study	
Suitability for employment	Postdoctoral positions in research groups at universities and research laboratories. Jobs in universities or scientific research organizations, research positions in the field of scientific research, government agencies.
Further training	Lifelong learning to progress in scientific research and other activities (for example, highly specialized technological areas). Further study at the doctoral level is possible in areas close to chemistry, like biochemistry, materials science and pharmaceutical chemistry.
5 – Teaching and assessment	
Teaching and learning	In the beginning – close scientific guidance, support from the research supervisor, support and advice from other colleagues of the research groups, including post-doctoral students, more experienced graduate students and technicians. Study of scientific methodology on the basis of various courses offered by the program. Lecture courses, seminars, consultations, self-preparation in the library or using Internet resources, project work and individual consultations.
Assessment	Written and oral exams, assessment of presentations and scientific reports, public defense of the thesis involving scientists from other universities and research institutions

	of NAS of Ukraine.
6 – Program competencies	
Integral competence (IC)	The ability to resolve complex problems in the field of vocational and/or research innovative activity, rethinking existing and creating new holistic knowledge and/or professional practice (IC).
General competencies (GC)	General skills that can be developed in the context of chemistry and can be applied in many other contexts. 1. Ability of abstract thinking, analysis and synthesis (GC-1). 2. Skills related to the use of information and communication technologies (GC-2). 3. Ability to conduct independent research at the modern level (GC-3). 4. Ability to search, to collect and to analyse information from various sources (GC-4) 5. Capacity to generate new ideas (Creativity) (GC-5) 6. Ability to work in the international scientific space (GC-6) 7. Ability to develop and manage research projects (GC-7) 8. Ability to apply knowledge in practical situations (GC-8). 9. Ability to work in a team, the ability to motivate others to move towards a common goal (GC-9) 10. Ability to communicate on professional topics with non-specialists (GC-10) 11. Skills of presentation of scientific materials and arguments in written and oral form before the target audience (GC-11).
Professional competencies of the specialty (PC)	Chemistry-related cognitive abilities and skills, i.e. abilities and skills of solving intellectual tasks and problems 1. Ability to formulate a scientific problem, to create working hypotheses on the researched problem, which involves a deep rethinking of existing and the creation of new holistic knowledge and/or professional practice (PC-1). 2. Ability to critically analyze and evaluate modern scientific achievements, generate new ideas in resolving research and practical problems (PC-2). 3. Ability to apply knowledge and skills in solving

	quantitative and qualitative chemical problems of unknown type (PC-3). 4. Ability to demonstrate knowledge and understanding of important facts, concepts, principles and theories in chemistry (PC-4). 5. Ability to interpret data obtained in laboratory experiments and measurements and relate them to the appropriate theory (PC-5). 6. Ability to communicate on professional topics and write professional texts in English (PC-6). 7. Ability to plan, design and perform scientific researches / projects from the first stage of setting the task to the last stage of assessment and analysis of results and obtained data, which includes the skills in selecting the necessary methods and procedures (PC-7). 8.Ability to master new areas of chemistry through self-learning (PC-8). 9. Ability to participate effectively in interdisciplinary teams working on chemistry projects (PC-9). 10. Skills in using computer and communication technologies to solve applied problems of chemistry (PC-10). 11.Understanding of ethical and social problems facing chemistry, understanding of the ethical standards of research and professional activity in the field of chemistry ethics of scientific research) (PC-11). 12.Being able to carry out the following activities: introduction and development of innovations and development of scientific and technological innovations; planning and management of chemistry-related technologies in such sectors as industry, environmental and health protection, preservation of cultural heritage, promotion of science with emphasis on theoretical, experimental and applied aspects of modern chemistry (PK-12). 13. Skills in using modern computer and communication techniques in chemistry (PC-13). 14. Learning skills necessary for further professional development (FC-14).
7 - Learning outcomes	
Program learning outcomes (PLO)	***<u>Knowledge and skills</u>*** 1. Modern conceptual and methodological knowledge in the field of chemistry and related fields of

	knowledge (PLO-1). 2. Knowledge of the works of leading foreign scientists, scientific schools and fundamental works in the field of research, formulation of the purpose of own research in the context of the world scientific process (PLO-2). 3. Knowledge of the principles of financing of research work and the structure of estimates for its implementation, the ability to prepare a request for funding, preparation of reporting documentation (PLO-3). 4. Ability to perform critical analysis, assessment and synthesis of new ideas (PLO-4). 5. Ability to formulate the general methodological basis of own scientific research from new (namely research) point of view, to realize its relevance, purpose and significance for the development of other branches of science, social, political, and economic life (PLO-5). 6. To initiate, organize and conduct comprehensive research in the field of research and innovation activities which lead to the acquisition of new knowledge (PLO-6). 7. Be able to form a team of researchers to resolve a specific problem (formulation of a problem, formulation of working hypotheses, collecting information, preparing proposals) (PLO-7). 8. Ability to formulate a scientific problem taking into account modern scientific tendencies (PLO-8). 9. To formulate working hypotheses and construct models of the researched problem (PLO-9). 10. To analyze scientific works in the field of chemistry and related sciences, identifying the controversial and little-studied issues (PLO-10) 11. To monitor scientific sources of information related to the researched problem (PLO-11). 12. To conduct a comparative analysis and evaluation of information sources (PLO-12). 13. To determine principles and methods of research using interdisciplinary approaches (PLO-13). ***Communication*** 14. Ability to communicate and have a dialogue with a

	broad scientific community and the general public on chemistry-related topics (PLO-14). 15. Ability to reflect competently the results of scientific research in scientific articles in professional journals, to conduct an effective dialogue with reviewers and editors (PLO-15). 16. Ability to professionally present the results of own research at international scientific conferences, seminars; use a foreign language (primarily English) in scientific, innovative and pedagogical activities (PLO-16). 17. Ability to work in a team, to have skills of interpersonal interaction (PLO-17). 18. Use modern information and communication technologies in the process of communication, information exchange, collection, analysis, processing, and interpretation of sources (PLO-18). ***Autonomy and responsibility*** 19. Initiation of scientific and innovative complex projects in the field of chemistry; leadership and autonomy during their implementation (PLO-19). 20. Ability to act in a manner of social responsibility, civic consciousness and adhere to professional and corporate ethics (PLO-20). 21. The ability to self-develop and self-improve, to be responsible for the scientific novelty of the research and expert decision-making (PLO-21). 22. The ability to make reasonable and informed decisions, to motivate people (PLO-22).
8 - Resource support for program implementation	
Specific characteristics of staffing	The main staff is lecturers of the Faculty of Chemistry of Taras Shevchenko National University, among them are 19 doctors of science in chemistry, 2 corresponding members of the National Academy of Sciences of Ukraine, 8 laureates of the State Prize of Ukraine in the field of science and technology.
Specific characteristics of material and technical support of educational process	For material and technical support of research work, as well as conducting experimental research during the dissertation work at the Faculty of Chemistry there are training and research laboratories (total area 11039.6 m^2) and specialized equipment and devices, namely: NMR spectrometer Varian Mercury 400; IR spectrometer Perkin Elmer BX II;

	element analyzer VarioMicroCube; modified Soxhlet extractors of continuous action; automatic Kofler hot bench for measurements of a melting point; Stahl's device for bringing on sorbents on glass chromatographic plates; Fourier transform IR spectrometer Nicolet Nexus 470; luminescent spectrofluorometer LS55 (Perkin Elmer); gas chromatograph 6890N GC (Agilent technologies, USA); gas chromatograph Varian GC 3900; digital flame photometer PFP-7; electrothermal atomization atomic absorption spectrophotometer AA6800G (Shimadzu Corporation); mass spectrometer Varian Saturn 2100T; scanning spectrophotometer UV-VIS Unico 2800 (USA); spectrophotometer UV-2401PC (Shimadzu Corporation); spectrophotometer Specord M-40-UV VIS N437380 with attachments for measuring solutions and solids; portable colorimeter (COLORIMETER); spectrophotometer Unico 1201 (USA); photoelectrocolorimeters; polarograph Expert ECO TEST; pH meter set from NPO «Izmeritelnaya tehnika» RF pH-150MI; laboratory pH-meter (ionometer) (ST3100); waterproof pH meter pH 56 (Wilwaukee); analytical balance KERN ABS-80-4 (Germany); analytical balance KERN ABJ 80-4M (Germany); heating magnetic stirrers MS300 (ULAB); magnetic stirrers MM5; centrifuges OPN-8; laboratory drying ovens; muffle furnace (3 pieces); thermostat; distillers; electric stoves; rotary evaporators; magnetic and mechanical stirrers; gas chromatographs (Shimadzu GC-14B, Shimadzu GC-2014 ASeries); integrator (ShimadzuC-R8A); spectrophotometer (UV/Vis VarianCary 50);

	X-ray diffractometer (“Dron-3M”, “Dron-3”); IR-spectrometer (Specord 71 IR). Part of the experimental research related to dissertation work is performed in collaboration with specialized institutes of the NAS of Ukraine, as well as other enterprises and organizations (JSC "Farmak", National Anti-Doping Center, Enamine Ltd.), using their specialized equipment. Such cooperation is governed by the relevant cooperation agreements.
Specific characteristics of information, educational and methodical support	The Faculty of Chemistry has a library where students have access to chemical educational and methodical literature, monographies (over 10,000 titles) and specialized periodicals (169 titles). Postgraduate students of the Faculty of Chemistry have the opportunity to use the library funds of Institutes of the NAS of Ukraine (Institute of Organic Chemistry, Institute of Bioorganic Chemistry and Petrochemistry, Institute of Inorganic Chemistry, Institute of Surface, Institute of Physical Chemistry). There is a local computer network that provides the organization of the educational process, contains free software for general and special purposes, as well as a separate page with proposals for the employment of graduates of the faculty. The faculty website contains the necessary methodical materials for studying and an electronic library with the literature on chemistry and other topics. The computer network provides access to electronic databases Reaxys, Scopus, full-text dissertations. Every year the Faculty of Chemistry organizes International conferences of students and postgraduate students, that gives a good opportunity to report the results of scientific research.
9 – Academic mobility	
National credit mobility	
International credit mobility	
Training of foreign applicants for higher education	**On general grounds**

2. LIST OF THE COMPONENTS OF THE EDUCATIONAL AND SCIENTIFIC PROGRAM (ESP) AND THEIR LOGICAL SEQUENCE

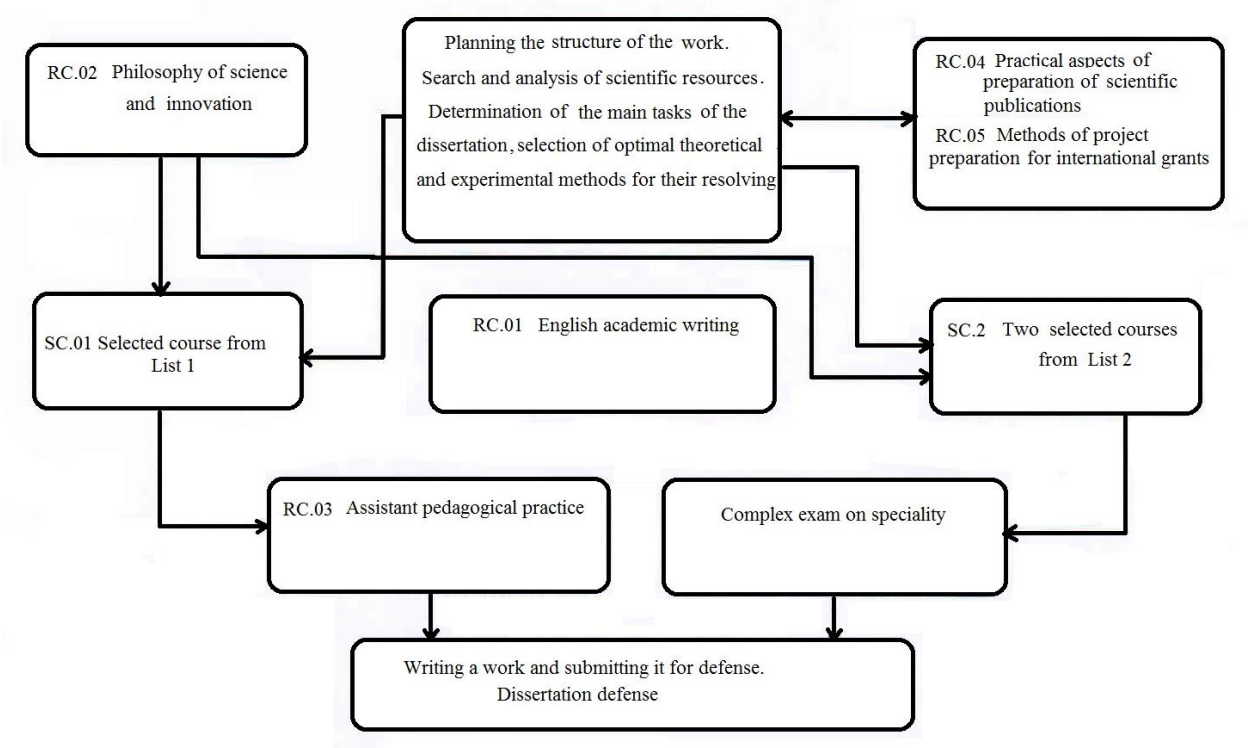
2.1. List of the components of ESP

Course code	components of ESP (courses, course projects, practice, qualification work)	Number of credits	Form of final control
Required components of ESP			
RC.01	English Academic writing	3.0	**exam**
RC.02	Philosophy of science and innovation	7.0	**exam**
RC.03	Assistant pedagogical practice	10.0	**credit**
RC.04	Practical aspects of preparation of scientific publications	5.0	**exam**
RC.05	Methods of project preparation for international grants	3.0	**exam**
The total amount of required components:		**28.0**	**credit**
Selective components of ESP			
List 1			
SC.1.01	Practical philosophy and epistemology of science	**4.0**	**exam**
SC.1.02	Professional and pedagogical competence of teachers of higher education institutions	-“-	-“-
SC.1.03	European grant system to support research and academic exchanges	-“-	-“-
SC.1.04	Commercialization of research and technology transfer	-“-	-“-
SC.1.05	Principles of organization of research work	-“-	-“-
SC.1.06	Scientific bibliography: workshop	-“-	-“-
SC.1.07	Scientific communication: methods of publishing research results	-“-	-“-
SC.1.08	Professional project management of research	-“-	-“-
SC.1.09	Intelligent calculations and data analysis	-“-	-“-
SC.1.10	Mineral raw material base of Ukraine	-“-	-“-
SC.1.11	Fundamentals of systems biology	-“-	-“-
SC.1.12	Modern quantitative methods of social data analysis	-“-	-“-
SC.1.13	Modern problems and trends in information technology	-“-	-“-
SC.1.14	Nanostructured polymeric materials for biotechnology, medicine, information technology and solar energy	-“-	-“-
SC.1.15	NMR spectroscopy for natural sciences	-“-	-“-
SC.1.16	Chaos theory	-“-	-“-
SC.1.17	Mathematical bases of information protection	-“-	-“-
SC.1.18	Mathematical theory of financial markets	-“-	-“-
SC.1.19	Civilizational, ethnocultural and interethnic processes in Europe	-“-	-“-
SC.1.20	Globalization processes in the modern world	-“-	-“-
SC.1.21	Current issues of modern society: Ukraine in global and regional comparisons	-“-	-“-
SC.1.22	Ukrainian scientific language	-“-	-“-
SC.1.23	Practical rhetoric	-“-	-“-

SC.1.24	Technologies of influence in business communication	-“-	-“-
SC.1.25	Psychology of communication	-“-	-“-
SC.1.26	Actual problems of Ukraine's foreign policy	-“-	-“-
SC.1.27	Intellectual property rights	-“-	-“-
SC.1.28	Securities Market	-“-	-“-
SC.1.29	Linguistic programming of people behavior	-“-	-“-
SC.1.30	Literature in the global aesthetic space of the XXI century	-“-	-“-
SC.1.31	Global changes to the climate, new geosphere trends	-“-	-“-
SC.1.32	Global problems of mankind and sustainable development	-“-	-“-
SC.1.33	Innovative technologies in the field of military and information security	-“-	-“-
SC.1.34	Methodology of conducting scientific research in the field of special purpose information technologies	-“-	-“-
SC.1.35	IT Essentials	-“-	-“-
SC.1.36	NDG Linux Esentials	-“-	-“-
SC.1.37	Softskills (in English)	-“-	-“-
Selective components of ESP. List 2			
SC.2.01	Modern methods of synthesis of inorganic, organometallic and coordination compounds	**8**	-“-
SC.2.02	Mesbauer spectroscopy	-“-	-“-
SC.2.03	Inorganic materials for special purposes	-“-	-“-
SC.2.04	The modern methods of sample preparation	-“-	-“-
SC.2.05	Innovative technologies in analytical chemistry	-“-	-“-
SC.2.06	Modern sensor and marker systems in analysis	-“-	-“-
SC.2.07	Modern methods of processing resonance spectra of organic compounds	-“-	-“-
SC.2.08	Quantum chemical calculations of organic compounds	-“-	-“-
SC.2.09	Strategies of modern synthesis of heterocyclic compounds	-“-	-“-
SC.2.10	Theory of electronic transfer processes	-“-	-“-
SC.2.11	Kinetics of rapid reactions	-“-	-“-
SC.2.12	Chemical enzymology	-“-	-“-
SC.2.13	Processing of experiment and registration of works on polymeric chemistry	-“-	-“-
SC.2.14	Practical skills of conducting an experiment in polymer chemistry polymer chemistry	-“-	-“-
SC.2.15	Computer modeling of physicochemical behavior of organic compounds and polymers	-“-	-“-
SC.2.16	Structure determination of natural compounds by resonance methods	-“-	-“-

SC.2.17	Methods of screening prediction of biological behavior of natural compounds	-"-	-"-
SC.2.18	Functionalization of natural compounds	-"-	-"-
SC.2.19	Chemistry and nanomaterials	-"-	-"-
SC.2.20	Modern aspects of supramolecular chemistry	-"-	-"-
SC.2.21	The latest aspects of the application of combinatorial methods in chemistry	-"-	-"-
SC.2.22	Colored special purpose materials: synthesis and research	-"-	-"-
The total amount of selected components		**12**	-"-
The total amount of educational components of ESP		**40**	-"-

2.2. Structural and logical scheme of ESP



3. ATTESTATION OF HIGHER EDUCATION APPLICANTS

Attestation of higher education applicants of educational level "Doctor of Philosophy" of specialty 102 Chemistry is carried out in two forms:

– comprehensive attestation exam in chemistry;

– public defense of the PhD thesis.

Comprehensive attestation exam involves the assessment of program learning outcomes defined by this educational program.

The PhD thesis involves conducting independent research or solving a complex specialized problem and/or practical problem in the field of chemistry using theoretical and/or experimental methods. The PhD thesis must be tested for plagiarism.

Attestation is carried out as a result of a procedure of an open public defense.

4. MATRIX OF CORRESPONDENCE OF PROGRAM COMPETENCES TO COMPONENTS OF THE EDUCATIONAL PROGRAM

	RC.01	RC.02	RC.03	RC.04	RC.05	SC.1.01	SC.2.01	SC.2.02	SC.2.03	SC.2.04	SC.2.05	SC.2.06	SC.2.07	SC.2.08	SC.2.09	SC.2.10	SC.2.11	SC.2.12	SC.2.13	SC.2.14	SC.2.15	SC.2.16	SC.2.17	SC.2.18	SC.2.19	SC.2.20	SC.2.21	SC.2.22
General competencies																												
1. GC-1		+				+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
2. GC-2		+				+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
3. GC-3		+				+	+	+																				
4. GC-4		+				+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
5. GC-5		+				+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
6. GC-6	+	+				+		+																				
7. GC-7		+			+	+																						
8. GC-8		+				+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
9. GC-9		+				+																						
10. GC-10		+			+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
11. GC-11	+	+		+		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Professional competencies																												
1. PC-1		+		+	+		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
2. PC-2		+		+	+		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
3. PC-3		+		+	+		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
4. PC-4		+		+	+		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
5. PC-5		+		+	+		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
6. PC-6		+		+	+		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
7. PC-7		+		+	+		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
8. PC-8		+		+	+		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
9. PC-9		+		+	+		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
10. PC-10		+		+	+		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
11. PC-11		+		+	+		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
12. PC-12		+		+	+		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
13. PC-13		+		+	+		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
14. PC-14		+		+	+		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+

5. MATRIX OF PROVIDING PROGRAM LEARNING OUTCOMES WITH THE RELEVANT COMPONENTS OF THE EDUCATIONAL AND SCIENTIFIC PROGRAM

	RC.01	RC.02	RC.03	RC.04	RC.05	SC.1.01	SC.2.01	SC.2.02	SC.2.03	SC.2.04	SC.2.05	SC.2.06	SC.2.07	SC.2.08	SC.2.09	SC.2.10	SC.2.11	SC.2.12	SC.2.13	SC.2.14	SC.2.15	SC.2.16	SC.2.17	SC.2.18	SC.2.19	SC.2.20	SC.2.21	SC.2.22
Knowledge and skills																												
PLO-1		+		+		+	+			+				+		+	+			+					+			
PLO-2		+		+		+	+	+		+		+	+		+		+					+		+		+		
PLO-3							+	+	+				+	+					+		+		+				+	+	+
PLO-4		+	+	+	+	+							+	+		+			+				+				+	+
PLO-5				+	+	+											+	+	+		+		+			+	+	+
PLO-6						+	+	+	+	+	+		+	+	+	+		+		+	+		+				+	+
PLO-7							+	+		+	+		+		+		+			+	+		+				+	+
PLO-8		+		+	+	+							+	+		+			+	+		+	+				+	
PLO-9		+		+		+							+			+			+	+		+	+				+	+
PLO-10			+		+	+							+	+					+	+			+				+	+
PLO-11			+		+															+			+				+	+
PLO-12			+		+															+			+				+	+
PLO-13		+		+		+										+			+			+	+				+	+
Communication																												
PLO-14	+								+				+		+				+		+		+				+	+
PLO-15	+				+			+					+	+		+		+	+		+		+				+	+
PLO-16	+				+				+				+						+				+				+	+
PLO-17							+	+				+	+								+							
PLO-18			+		+								+							+	+				+			
Autonomy and responsibility																												
PLO-19	+			+		+	+																					
PLO-20	+					+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
PLO-21	+	+				+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
PLO-22	+	+				+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+

The Program Developers

First name, family name	Position	Name of institution which the lecturer graduated from, (graduation year, specialty, qualification (according to the document on higher education)	Scientific degree, code and name of scientific specialty, dissertation topic, academic title, by which department (specialty) is assigned	Experience of scientific and pedagogical work, years
Yulian M. Volovenko (the Head of the working group)	Dean of the Faculty of Chemistry, Professor	Kyiv State University named after T.G. Shevchenko, 1972, specialty chemistry, *qualification* - chemist by specialty organic chemistry	Dr. Sci. Chemistry, *specialty* 02.00.03 – Organic chemistry, Thesis: "Synthesis of heterocyclic β -enamine ketones and condensed azines based on substituted acetonitriles", Professor of the Organic Chemistry Department	44
Vasyl G. Pivovarenko (the Guarantor of the Program)	Professor of the Organic Chemistry Department	Kyiv State University named after T.G. Shevchenko, 1980, specialty chemistry, *qualification* - chemist by specialty organic chemistry	Dr. Sci. Chemistry, *specialty* 02.00.03 – Organic chemistry, Thesis: "Synthesis, structure and properties of multi-channel fluorescence probes on the basis of 1,3-diarylideneketones, dicyclopenta[*b,e*]pyridines and 3-hydroxychromones.", Professor of the Organic Chemistry Department	36
Mykola S. Slobodyanik	Head of the Department of Inorganic Chemistry, Corresponding member of the NAS of	Kyiv State University named after T.G. Shevchenko, 1968, specialty chemistry, *qualification* - chemist by specialty inorganic chemistry	Dr. Sci. Chemistry, *specialty* 02.00.01 – Inorganic chemistry, Thesis: „Directed synthesis of double phosphates of mono- and polyvalent metals from molten salts", Professor of the Inorganic Chemistry Department	48

	Ukraine			
Volodymyr P. Khylya	Head of the Department of Organic Chemistry, Corresponding member of the NAS of Ukraine	Kyiv State University named after T.G. Shevchenko, 1962, specialty chemistry, *qualification* - chemist, teacher of chemistry	Dr. Sci. Chemistry, *specialty* 02.00.03 – Organic chemistry, Thesis: "Modified flavonoids, isoflavonoids and nitrogen-containing heterocyclic systems on their basis" (1986). Professor of the Inorganic Chemistry Department (1988) Corresponding member of the NAS of Ukraine, (2000)	53
Igor O. Fritsky	Head of the Department of Physical Chemistry, professor	Kyiv State University named after T.G.Shevchenko 1987, *specialty* chemistry, *qualification* - chemist, teacher of chemistry	Dr. Sci. Chemistry, *specialty* 02.00.01 – Inorganic chemistry, Thesis: "Polynuclear coordination compounds of transition metals with nitrogen-containing ligands in modeling of active centers of metalloenzymes" Professor of the Physical Chemistry Department	31
Oleksii Yu. Kolendo	Professor of the Department of Polymer Chemistry	Kyiv State University named after T.G.Shevchenko 1981, *specialty* chemistry, organic chemistry *qualification* - chemist, teacher of chemistry	Dr. Sci. Chemistry, *specialty* 02.00.06 – Polymer chemistry, Thesis: "Exciton support of chemical reactions in polymers and model organic compounds" Professor of the Polymer Chemistry Department	35

Olga A. Zaporozhets	Head of the Department of Analytical Chemistry, professor	Kyiv State University named after T.G.Shevchenko 1982, *specialty* chemistry, *qualification* - chemist, teacher of chemistry	Dr. Sci. Chemistry, *specialty* 02.00.02 – Analytical chemistry, Thesis: "Organic reagents adsorbed on silica in combined spectroscopic and test methods of analysis" Professor of the Analytical Chemistry Department	34
Olena V. Ischenko	Professor of the Department of Physical Chemistry	Kyiv State University named after T.G.Shevchenko 1980, *specialty* chemistry, physical chemistry, *qualification* - chemist, teacher of chemistry	Dr. Sci. Chemistry, *specialty* 02.00.04 – Physical chemistry, Thesis: "Catalytic transformations of small molecules on complex systems based on 3d- and 4d-elements" Professor of the Physical Chemistry Department	36

When developing the program, the requirements of the draft educational standard of specialty 102 Chemistry of the third level of higher education were taken into account