

MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE
NATIONAL TECHNICAL UNIVERSITY
"KHARKIV POLYTECHNICAL INSTITUTE"

EDUCATIONAL-PROFESSIONAL PROGRAM

**Information Systems Software
The second (Master's) level**

specialty **126 Information systems and
technologies**
the branch **of** **12 Information Technologies**
knowledge
qualification **Master of Information Systems and
Technologies**

APPROVED by Academic Council
Chairman of the Academic Council
NTU "KhPI"

_____ L.L. Tovazhniansky
« ___ » _____ 20_____.
protocol № __ from « ___ » _____ 2019.

The educational program is put into action
Rector _____ Ye.I. Sokol
(Order № __ from « ___ » _____ 2019)

NTU "KhPI"
Kharkiv 2019

LETTER OF APPROVAL
educational and professional program

Level of higher education	<u>The second (Master's) level</u>
Branch of knowledge	<u>12 Information Technologies</u>
Specialty	<u>121 «Information systems technologies»</u>
Specialization	<u>126-01 «Information Systems Software»</u>
Qualification	<u>Master of Information systems and technologies</u>

APPROVED

Scientific-methodical committee
on the specialty "Information systems and
technologies"
Head of the committee

_____ N..V. Sharonova
« ____ » _____ 201_ .

RECOMMENDED

Methodical Council of NTU "KhPI"
Deputy Chairman of the methodical council

_____ R.P. Migushchenko
« ____ » _____ 201_ .

AGREED

Head of the Department of Software
Engineering and Management Information
Technologies

_____ M.D. Godlevsky
« ____ » _____ 201_ .

AGREED

Dean of the Faculty of Computer
sciences and software engineering

_____ M.M. Malko
« ____ » _____ 201_ .

APPROVED AND PROVIDED

By order of the rector of the National Technical University "Kharkiv Polytechnic
Institute" from « ____ » _____ 20__ . № _____ .

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PREFACE

The educational program (EP) for the training of bachelors in the specialty 126 – Information systems and technologies is a temporary normative document, which summarizes the content of education, that is, reflects the goals of education and training, determines the position of a specialist in the structure of the state economy and the requirements for its competencies and other socially important features and qualities.

Introduced by the National Technical University "Kharkiv Polytechnic Institute" as a temporary document for the introduction of the standards of higher education in Ukraine.

Developed by a working group of the Department of Software Engineering and Management Information Technologies of the Faculty of Computer Science and Software Engineering of the National Technical University "Kharkiv Polytechnic Institute", consisting of:

1. Doctor of Technical Sciences, Professor N.V. Sharonova is the head of the department of Intelligent Computer Systems, the head of the project group (guarantor of the educational program).
2. Doctor of Technical Sciences, Professor N.F. Khayrova – Professor of the Department of Intelligent Computer Systems.
3. Candidate of Technical Sciences, Associate Professor O.Yu. Cherednichenko – Assistant Professor of Software Engineering and Management Information Technologies.

Reviews of external stackers:

1. Company Nix Solutions
2. Telesens company
3. Company Sigma

Developed by a working group

Chairman of the working group:

Sharonova N.V., Doctor of Technical Sciences, Professor,
Head of the Department of Intelligent Computer Systems of the
National Technical University "Kharkiv Polytechnic Institute"

Members of the working group:

Khayrova N.F., Doctor of Technical Sciences, Professor,
Professor of the Department of Intelligent Computer Systems of the
National Technical University "Kharkiv Polytechnic Institute"

Cherednichenko O.Yu., Candidate of Technical Sciences,
Associate Professor, Associate Professor of the Software
Engineering and Management Information Technologies
Department of the National Technical University "Kharkiv
Polytechnic Institute"

1. Profile of the educational program in specialty number 126 - Information systems and technologies

1 – General information	
Full name of higher educational institution and structural unit	National Technical University "Kharkiv Polytechnic Institute", Faculty of Computer Sciences and Software Engineering, Department of Software Engineering and Management Information Technologies
Degree of higher education and the name of the qualification	Master Educational qualification: Master of Information Systems and Technologies Qualification in the diploma: Master of Information Systems and Technologies
The official name of the educational program	Information Systems Software
Type of diploma and volume of educational program	Single, 90 ECTS credits, training period 1,4 years
Availability of accreditation	
Cycle / Level	NRC Ukraine - 7 level, FQ-EHEA - second cycle, EQF LLL - 7 level
Preconditions	Bachelor's degree in related (or other specialties) in accordance with the conditions and rules of admission.
Teaching language	Ukrainian, Russian, English
The duration of the educational program	
Internet address of the permanent description of the educational program	http://web.kpi.kharkov.ua/asu/specialnosti/
2 – The purpose of the educational program	
In-depth training of specialists in the field of information systems and technologies capable of putting scientific and production tasks in relation to the development, quality assurance and implementation of information systems, finding rational methods and means of their solution, solving the most complex of them, creating conditions for the sustainable development of IT- companies	

on the quality of the processes and results of the development of information systems.	
3 – Characteristics of the educational program	
Subject area (branch of knowledge, specialty, specialization)	Branch of knowledge: 12 Information Technologies Specialty: 126 - Information systems and technologies
Orientation of the educational program	The integration of professional training in the field of information systems and technologies with innovative and scientific activities, orientation towards implementation of real program projects, masters' participation in teams for the development and research of real software projects of complex software systems and instrumental software.
The main focus of the educational program and specialization	Special education in specialty Key words: software, information systems, information technologies
Features of the program	Research and solution of complex problems in the field of computer sciences, information technologies and research and innovation activity, analysis of existing modern information technologies. Focusing on partnership with domestic and foreign educational and scientific institutions, private sector, academics and practitioners, participation in international programs to improve the quality of education.
4 – Eligibility of graduates to employment and further training	
Suitability for employment	Professional activity as a software engineer; engineer-developer; system developer; database developer; web-developer; system administrator; information systems maintenance engineer; specialist in the development and testing of software. Graduates can work in professions according to the National Classification of Professions DK 003: 2010: 2131.2 Database Administrator 2131.2 Data Administrator 2131.2 Access Administrator 2131.2 System Administrator

	<p>2131.2 Computer Software Engineer 2132.2 Software engineer 2132.2 Developer (database) 2131.2 Software and multimedia analyst 2132.2 Application developer 2139.2 Computer Engineer 2149.2 Research engineer 3121.2 IT Specialist 3121.2 Specialist in Software Development and Testing 3121.2 Specialist in Software development 3121.2 Specialist in computer graphics (design)</p>
Further training	<p>The Master has the opportunity to study at the ninth degree (PhD) in an educational science program in accordance with the National Framework of Qualifications in the field of Knowledge "Information Technologies" or related branches of knowledge.</p>
5 – Teaching and evaluation	
Teaching and learning	<p>The teaching process involves the use of such learning techniques as: problem-oriented lectures, laboratory classes, small groups, discussion seminars, brain storms, presentations that develop communicative and leadership skills, independent work with literature/informational sources, generalization skills; writing of scientific articles, planning and implementation of research works and works of practical direction.</p>
Evaluation	<p>The academic performance assessment of knowledge and skills of students is carried out in the form of current and summative assessment. Assessment of students' knowledge is carried out according to the modular rating system. Current assessment involves knowledge, skills and abilities of students at lectures, laboratory, practical and seminar sessions, and during individual training tasks and modular test works assessment. The summative assessment is carried out in the form of examinations, credits and final certification. The summative assessment of knowledge in the form of an exam is made in written form. A student of higher education is considered to be</p>

	<p>admitted to the final examination in the disciplines of the educational program, if he has completed all types of work provided by the curriculum in this discipline. The summative assessment in the form of a differentiated credit is based on the results of the current assessment (the sum of the marks obtained by the results of the current assessment) without the submission of additional forms of assessment. The assessment of applicants for higher education is based on the results of examinations and differentiated credits for each semester.</p> <p>The attestation is carried out in the form of public defense (demonstration) of diploma work. The diploma work must include elements of research and practice. The institution of higher education should carry out a mandatory check on the plagiarism of all masters' diploma papers. The uniqueness of the text for the work of the educational and professional training program should be at least 70%.</p>
6 – Program competencies	
Integral competence	Ability to solve complex specialized tasks and practical problems in the field of IST in implementation of professional activity or in the process of learning that involves research and/or innovation.
General competencies	<p>GC 1 Ability to use the methodology for determining the risks and accepted, dangerous levels, to identify the factors of influence on the prevention of accidents, occupational diseases and accidents at objects (production).</p> <p>GC 2 Ability to prevent emergency situations in the field of software engineering and ensure the sustainable functioning of the enterprises concerned, as well as to forecast and assess the socio-economic consequences of emergency situations at the sites.</p> <p>GC 3 Ability to identify objects and subjects of intellectual property, to have knowledge of the peculiarities of legal protection, ways of commercialization and protection of the right to intellectual property, to assess the nature of the</p>

	violation of intellectual property rights, to have the basics of contractual relations in the field of intellectual property.
Professional competencies	<p>PC 1 Ability to</p> <ul style="list-style-type: none"> - form collective expert assessments and make decisions on their basis; - form quantitative and staff composition of expert groups, to know the basic stages of generating expert assessments. <p>Ability to apply in practice</p> <ul style="list-style-type: none"> - the main clauses of expert methods; - methods of clusterization and ranking of expert assessments, methods for coordinating assessments and finding aggregated expert group assessments. <p>PC 2 Ability to choose appropriate data management technologies depending on the needs of the domain.</p> <p>PC 3 Ability to strategic planning of IS.</p> <p>PC 4 Ability to plan and implement IS management system.</p> <p>PC 5 Understanding the principles of enterprise architecture and the value it provides to businesses.</p> <p>PC 6 Ability to create and deploy Enterprise Architecture.</p> <p>PC 7 Ability to manage information system risks.</p> <p>PC 8 Ability to manage IS / IT projects and software.</p> <p>PC 9 Ability to independently choose the approaches to managing information system design based on planning, hybrid and flexible development.</p> <p>PC 10 Ability to determine goals and priorities of tasks in the management of modern software projects. Identify and document system requirements. To choose methodology of project management, methods of formation of effective project teams.</p> <p>PC 11 Ability to manage IS development projects.</p> <p>PC 12 Ability to integrate and prepare data from different sources for analytical use.</p> <p>PC 13 Ability to choose and use appropriate analytical methods.</p> <p>PC 14 Ability to develop a business plan for the design and implementation of IS.</p>

	<p>PC 15 Understanding how to apply creative problem solving to technology issues.</p> <p>PC 16 Ability to implement and manage high-quality audit processes.</p> <p>PC 17 Ability to monitor new technologies in order to understand their potential for supporting the subject area.</p> <p>PC 18 Ability to write business and professional letters, educational and specialized essays, scientific and technical reports, notes and memoranda, as well as multimedia computer presentations.</p> <p>PC 19 Improve communication skills necessary for solving professional tasks, including discussion skills. Ability to write articles and reports on IT technologies and project management, as well as annotation and referencing of scientific articles.</p> <p>PC 20 The ability to compile reviews of scientific articles of various volumes (written and oral), as well as work with periodicals in English.</p>
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7 – Program training results	
Program results of training in general preparation	<p>RTg 1 Be able to:</p> <ul style="list-style-type: none"> - Analyze and predict the risks of designing and operating complex technical systems in the field of Software Engineering; - ensure the effectiveness of the operation of the security management system; <p>Make hazard maps and risk assessments in the workplace.</p> <p>RTg 2 Be able to:</p> <ul style="list-style-type: none"> - analyze and substantiate the organizational and technical measures on technogenic safety at enterprises, organizations, establishments and hazardous territories; - assess the consequences of the impact of the damaging factors of the accident on the objects; - to develop engineering and technical measures on the level of risk of accidents and emergencies. <p>RTg 3 Know the basic concepts in the field of legal protection of intellectual property in Ukraine, be able</p>

	<p>to work with normative legal acts of Ukraine and international agreements regulating relations in the field of intellectual property, know the conditions of granting legal protection to objects of intellectual property rights of Ukraine, be able to apply acquired knowledge in professional activity.</p> <p>RTg 4 Be able to think systematically when analyzing different situations, solving problems and tasks.</p> <p>RTg 5 Have the opportunity to apply the acquired knowledge creatively.</p> <p>RTg 6 Have the opportunity to work individually with minimum instructions, to manage own work and time.</p> <p>RTg 7 Have the opportunity to work effectively in a group, manage a team and work together.</p> <p>RTg 8 Be able to understand the impact of information systems' decisions on society and the environment and their economic aspects.</p>
<p>Program results of training in professional preparation</p>	<p>RT 1 Know the main clauses of the technology of structuring collective expert assessments and make decisions on their basis.</p> <p>Be able to form quantitative and staff composition of expert groups, to know the basic stages of generating expert assessments.</p> <p>Know the basic clauses of expert methods, clustering and ranking methods, group expert assessments, methods for coordinating evaluations, and finding aggregated expert group evaluations.</p> <p>RT 2 Have the opportunity to apply different methods of analysis of information systems and technologies.</p> <p>RT 3 Be able to identify, locate and evaluate information related to information systems using databases and other sources of information.</p> <p>RT 4 Be able to identify, analyze and understand the problems of the development of information systems.</p> <p>RT 5 Have the opportunity to manage information systems development projects and to define, analyze, evaluate and solve emerging management problems.</p> <p>RT 6 Have the opportunity to analyze, model and evaluate business processes of the organization in</p>

	<p>terms of development of information systems and technologies.</p> <p>RT 7 Have the opportunity to use various computer tools for analysis and design of information-analytical systems.</p> <p>RT 8 Know, understand, analyze, choose, apply methods and means of ensuring information security and integrity of data in accordance with application tasks being solved and information systems being created.</p> <p>RT 9 Have the opportunity to apply different tools for managing information systems projects.</p> <p>RT 10 Understand the basic concepts, facts, principles and theories of information systems and technologies.</p> <p>RT 11 Understand the diversity and current challenges in information systems and technologies.</p> <p>RT 12 Have the opportunity to choose and apply different technologies for the development of information systems.</p> <p>RT 13 Have the opportunity to develop innovative solutions for creating and maintaining IT business.</p> <p>RT 14 Understand the problems of users of information systems in order to be able to identify, analyze and describe the needs of users.</p> <p>RT 15 Knowledge of writing articles and reports on IT technologies and project management, as well as annotating and referencing of scientific articles, compilation of reviews of scientific articles of various volumes (written and oral), as well as work with periodicals in English, reading (without using dictionary).</p> <p>RT 16 Mastery of oral production skills and understanding the colleagues' presentations / reports, business correspondence, in particular, the ability to produce the main types of business correspondence when hiring or studying abroad.</p> <p>Ability to participate in the discussion, including on an unprepared subject.</p> <p>RT 17 Demonstrate reading comprehension and referencing of academic and professional materials of</p>
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	<p>any complexity, written reproduction of a wide range of business and professional communications.</p> <p>RT 18 To have skills of free perception of speech in foreign language (English), conversational interaction on general and specialty topics, spontaneous monologue broadcasting of foreign (especially English) language.</p>
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8 – Resource providing for the implementation of the program	
Staff providing	Meets staff requirements on ensuring the implementation of educational activities in the field of higher education in accordance with the current legislation of Ukraine (Resolution of the Cabinet of Ministers of Ukraine "On Approval of Licensing Conditions for the Educational Activities of Educational Institutions" of December 30, 2015, No. 1187, Appendix 12)
Material and technical providing	Complies with technological requirements on the material and technical providing of educational activities in the field of higher education in accordance with the current legislation of Ukraine (Resolution of the Cabinet of Ministers of Ukraine "On approval of Licensing conditions for conducting educational activities of educational institutions" dated December 30, 2015, No. 1187, Appendix 13)
Information and initial-methodical providing	Corresponds to the technological requirements for educational, methodological and informational providing of educational activities in the field of higher education in accordance with the current legislation of Ukraine (Resolution of the Cabinet of Ministers of Ukraine "On approval of licensing conditions for the educational activities of educational institutions" dated December 30, 2015, No. 1187, Annexes 14- 15)
9 – Academic mobility	
National Credit Mobility	On the basis of bilateral agreements between the National Technical University "Kharkiv Polytechnic Institute" and higher educational institutions of Ukraine
International Credit Mobility	On the basis of bilateral agreements between the National Technical University "Kharkiv Polytechnic Institute" and University Paris 13, Poznań University of Economics
Education of foreign applicants	It is possible after studying the course of Ukrainian language

2. The list of components of the educational-professional program and their logical consistency

2.1 List of components of EP

Код н/д	Program educational components	Number of credits	Form of final control
1	2	3	4
Compulsory components of EP			
CC 1	Occupational Safety in the industry	3	Credit
CC 2	Civil Defense	3	Credit
CC 3	Intellectual Property	3	Credit
CC 4	Innovation and entrepreneurship	3	Credit
CC 5	Enterprise Architecture Management	4	Exam
CC 6	Databases and Data Storages	4	Exam
CC 7	Development and implementation of information systems	4	Credit
CC 8	Information Systems Project Management	4	Exam
CC 9	IT infrastructure	3	Exam
CC 10	Security of information systems	3	Credit
CC 11	Models and methods of decision support	3	Exam
CC 12	Pre-diploma internship	15	
CC 13	Graduate project design	11	
CC 14	Attestation	4	
	Total number of compulsory components	67	
Sample components of EP			
SC 1	Fundamentals of the scientific research	3	Credit
SC 2	English for academic purposes	6	Credit
SC 3	Strategy of information systems	3	Credit
Sample set 1			

SS 1.1	Simulation and analysis of business systems and processes	4	Credit
SS 1.2	Analysis and management requirements for software information systems	4	Exam
SS 1.3	Introduction to DevOps	3	Exam
Sample set 2			
SS 2.1	Introduction to Business Analytics	4	Credit
SS 2.2	Intellectual analysis of data and knowledge extraction	4	Exam
SS 2.3	Methods and models of management of modern business systems	3	Exam
	Total number of sample components:	23	
	Total number OF THE EDUCATIONAL PROGRAM:	90	

2.2 Structural-logical scheme EP

Semester	Contents of educational activity
9	CC 4, CC 5, CC 6, CC 7, CC 8, CC 2, SS 1.1, SS 1.2, SS 2.1, SS 2.2
10	CC 1, CC 2, CC 3, CC 9, CC 10, CC 11, SS 1.3, SS 2.3, SC1, SC2, SC 3
11	CC 12, CC 13, CC 14

3. Form of attestation of applicants for higher education

Attestation of graduates in the higher educational program of specialty number 126 – Information systems and technologies is carried out in the form of Master's qualification thesis defense and ends with the issuance of a standard-issue document of awarding him a Master's Degree with a qualification: a Master of Information Systems and Technologies.

The attestation is carried out openly and publicly.

4. Matrix of compliance of program competencies to the components of the educational program

	GC1	GC2	GC3	PC1	PC2	PC3	PC4	PC5	PC6	PC7	PC8	PC9	PC10	PC11	PC12	PC13	PC14	PC15	PC16	PC17	PC20	PC21	PC22
CC 1	•																						
CC 2		•																					
CC 3			•																				
CC 4									•														
CC 5								•															
CC 6					•																		
CC 7							•																
CC 8											•												
CC 9								•															
CC 10										•													
CC 11				•	•																		
CC 12				•								•										•	•
CC 13												•	•									•	•
CC 14				•											•							•	•
SC 1																					•	•	•
SC 2																							•
SC 3							•																
SS 1.1												•					•	•					
SS 1.2													•	•					•				
SS 1.3					•										•	•				•			
SS 2.1												•				•	•						
SS 2.2													•	•					•				
SS 2.3					•										•	•				•			

5. Matrix providing program training results for the corresponding components of the educational program

	RTg1	RTg2	RTg3	RTg4	RTg5	RTg6	RTg7	RTg8	RT1	RT2	RT3	RT4	RT5	RT6	RT7	RT8	RT9	RT10	RT11	RT12	RT13	RT14	RT15	RT16	RT17	RT18	
CC 1	.																										
CC 2		.																									
CC 3			.																								
CC 4						.									.												
CC 5													.														
CC 6									.																		
CC 7											.																
CC 8												.															
CC 9												.															
CC 10														.													
CC 11								.	.																		
CC 12				
CC 13				
CC 14								
SC 1				
SC 2																										.	
SC 3										.																	
SS 1.1										
SS 1.2								
SS 1.3								
SS 2.1										
SS 2.2								
SS 2.3								

Head of the graduation department _____ M.D. Godlevsky
 (signature) (last name)

Head of the project team (guarantor of the educational program)
 _____ N.V. Sharonova
 (signature) (last name)