3. Educational program

Director of the Master's degree programme - N.Kotenko, PhD in Education, Associate Professor of the Department of Software Engineering and Cyber Security

3.1. Profile of the educational program "Software Engineering" from the specialty 121 "Software Engineering", specialization "Software Engineering"

1 – - General information	
Full name of the higher educational establishment and structural unit	State University of Trade and Economics Faculty of Information Technologies Department of Software Engineering and Cyber Security
Degree of higher education / vocational pre-higher education and title of qualification in original language	degree of higher education "master" specialty "Software Engineering"
The official name of the educational program	"Software Engineering"
Compliance with the standard of higher education of the Ministry of Education and Science of Ukraine	Corresponds to the Higher Education Standards of the Ministry of Education and Science of Ukraine
Type of diploma and volume of educational program	Master's degree, unitary, 90 ECTS credits, term of training – 1 year 4 months
Presence of accreditation	National Agency for Quality Assurance in Higher Education of Ukraine; Decision № 17 (3.97) dated 23.12.2019; The certificate is valid until 23.12.2024.
Cycle / Level	NRC Ukraine - 8 level, FQ-EHEA - second cycle, EQF-LLL - 7 level
Prerequisites	Scientific degree - Bachelor
Language (s) Teaching	Ukrainian
Validity of the educational program	1 year 4 months
Internet address of the permanent placement of the description of the educational program	https://knute.edu.ua
2 – The purpose of the educational program	
Formation of the personality of a specialist, capable to solve complex non-standard tasks and problems of research and innovative character in the field of software engineering	
3 – Characteristics of the educational program	
Subject area	Object of study and activity: processes of software development, modification, analysis, quality assurance, implementation and maintenance.

	Training goals: training of specialists who are able to solve complex tasks and problems in the development, quality assurance, implementation and support of software tools, which involves conducting research and/or implementing innovations and is characterized by the uncertainty of conditions and requirements. Methods, techniques and technologies: methods of analysis and modeling of the application area, identification of information needs, classification and analysis of data for software design; methods of developing software requirements; methods of analysis and construction of software models; methods of software design, construction, integration, testing and verification; methods of modifying software components and data; reliability and quality models and methods in software engineering; software project management methods. Tools and equipment: software, hardware and cloud tools to support software engineering processes.
Orientation of educational program	The program is focused on educational, professional and applied training
The main focus of the educational program and specialization	Educational and professional. Emphasis on the ability of the specialist to carry out research and innovation activities in the real conditions of industrial software production. Keywords: functional programming, logical programming, biometric authentication technologies; GRID technologies; design of multimedia systems; security of telecommunication networks
Features of the program	Integration of professional training in the field of software engineering with innovative activities, focus on the implementation of real software projects.
4 - Eligibility of graduates for employment and further training	
Eligibility for employment	The specialist may hold primary positions (according to the Classifier of Professions of Ukraine ДК 003: 2010): 2132.2 (22481). Can hold the following positions: software developer; back-end developer; developer (applied); system developer; computer software engineer; junior researcher (programming); researcher (programming); researcher-consultant (programming).
Further education	Studying for the programs: the third educational (educational-scientific) level, the first scientific degree
5 – Teaching and evaluation	
Teaching and learning	Focused on students teaching, self-studying, laboratory-based learning, problem-based, interactive, project-based, information-computer, self-development, collective and integrative, contextual learning technologies
Assessment	"Regulations on the organization of the educational process of students" "Regulations on the evaluation of learning outcomes of students and graduate students." Written exams, practice, essays, presentations, testing, defense of laboratory works, defense of individual works, defense of the final qualification project.
6 – Program competencies	
Integral competence	A person's ability to solve complex problems and problems in a particular field of professional activity or in the learning process, which involves research and / or innovation and is characterized by uncertainty of conditions and requirements.

General competences (GC)	GC01. Ability to abstract thinking, analysis and synthesis. GC02. Ability to communicate in a foreign language both orally and in writing. GC03. Ability to conduct theoretical and applied research at the appropriate level. GC04. Ability to communicate with representatives of other professional groups of different levels (with experts from other fields of knowledge / types of economic activity). GC05. Ability to generate new ideas (creativity).
Special competencies (SC)	SC01. Ability to analyze subject areas, form, analyze and model software requirements. SC02. Ability to develop and implement scientific and / or applied projects in the field of software engineering. SC03. Ability to design software architecture, model the operation of individual subsystems and modules. SC04. Ability to develop and implement new competitive ideas in software engineering. SC05. Ability to develop, analyze and apply specifications, standards, rules and guidelines in the field of software engineering. SC06. Ability to effectively manage financial, human, technical and other project resources in the field of software engineering. SC07. Ability to critically comprehend problems in the field of information technology and on the border of fields of knowledge, to integrate relevant knowledge and solve complex problems in broad or multidisciplinary contexts. SC08. Ability to develop and coordinate processes, stages and iterations of the software life cycle based on the application of modern models, methods and technologies of software development. SC09. Ability to ensure software quality.
7 – Program learning outcomes	
	PLO 01. To know and apply modern professional standards and other legal documents on software engineering PLO 02. To evaluate and select effective methods and models for the development, implementation, maintenance of software and management of relevant processes at all stages of the life cycle. PLO 03. To build and research models of information processes in the application field. PLO 04. To identify information needs and classify data for software design. PLO 05. To develop, analyze, justify and systematize software requirements. PLO 06. To develop and evaluate software design strategies; substantiate, analyze and evaluate design solutions in terms of quality of the final software product, resource constraints and other factors. PLO 07. To analyze, evaluate and apply at the system level modern software and hardware platforms to solve complex problems of software engineering. PLO 08. To develop and modify software architecture to meet customer requirements. PLO 09. Reasonably to choose paradigms and programming languages for software development; to apply in practice modern software development tools. PLO 10. To modify existing and develop new algorithmic solutions for detailed software design. PLO 11. To ensure quality at all stages of the software life cycle, including using relevant models and assessment methods, as well as automated software testing and verification tools.

	PLO 12. To make effective organizational and managerial decisions in conditions of uncertainty and changing requirements, compare alternatives, assess risks. PLO 13. To configure software, manage its changes and develop software documentation at all stages of the life cycle. PLO 14. To predict the development of software systems and information technology . PLO 15. To carry out software reengineering in accordance with customer requirements. PLO 16. To plan, organize and perform software testing, verification and validation. PLO 17. To collect, analyze, evaluate the information needed to solve scientific and applied problems, using scientific and technical literature, databases and other sources.
8 – Resource support for the implementation of the program	
Personnel provision	Project team: 2 Phd and 2 Doctors All developers are full-time employees of the Kyiv National University of Trade and Economics. Scientific and pedagogical workers with scientific degrees and / or academic titles, as well as highly qualified specialists are involved in the implementation of the program. In order to improve their professional level, all scientific and pedagogical workers undergo internships at least once every five years.
Material and technical support	Use of KNUTE laboratories, computer and specialized classrooms
Informational and educational support	The available MOODLE distance learning system, educational platform of the university "MIA: Education" and the MS Office 365 environment provide independent and individual work of students.
9 – Academic mobility	
National credit mobility	Credit Mobility Organization Project by EPAM SYSTEMS Company, SE "Ukrainian Institute of Intellectual Property", Prokom Certified Training Center, Pearson Education Company, Parus Corporation, BGS Group of Companies.
International credit mobility	Project Paris Est Creteil University (Paris, France), Audencia Business School (Nantes, France, University of Grenoble Alps (Grenoble, France), University of Central Lancashire (Preston, UK), Hohenheim University (Stuttgart, Germany).
Education for foreign applicants for higher education	Provided.

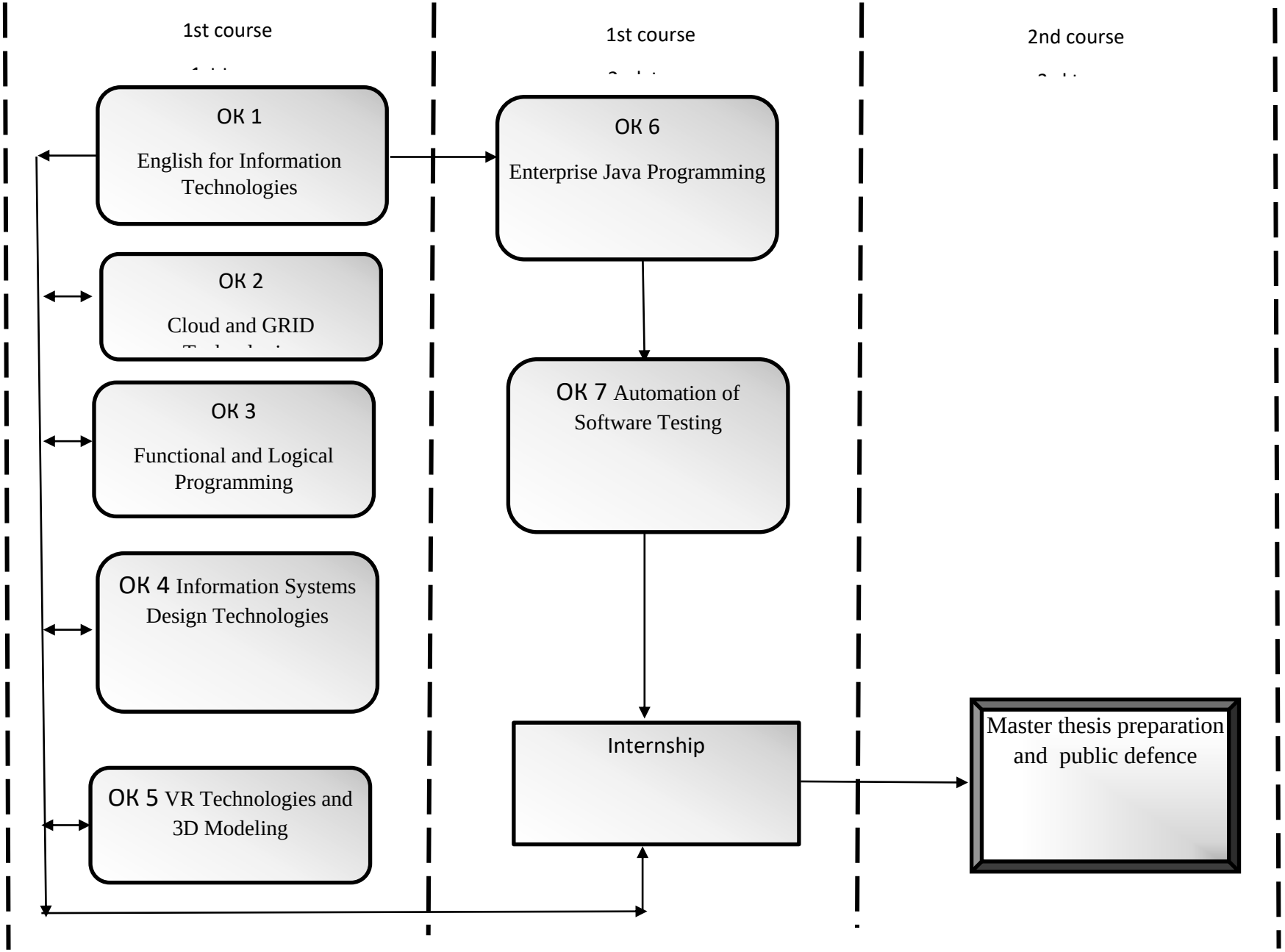
2. List of components of the educational program and their logical consistency

2.1. List of components of EP

Code e/d	Components of the educational program (academic disciplines, course projects (works), practices, qualification exam, final qualifying work)	Number of credits
1	2	3
Compulsory Components of EP		
CC 1.	English for Information Technologies	6
CC 2.	Cloud and GRID Technologies	6
CC 3.	Functional and Logical Programming	6
CC 4.	Information Systems Design Technologies	6
CC 5.	VR Technologies and 3D Modeling	6
CC 6.	Enterprise Java Programming	7,5
CC 7.	Automation of Software Testing	6
Total of Compulsory Components:		**43,5**
Optional Components of EP		
OC 1	Architecture and Technologies of Mobile Application Programming	6
OK 2.	Database administration and protection	6
OC 3.	Life Safety	6
OC 4.	Biometric Authentication Technologies in Information Systems	6
OC 5.	Protection of electronic communication systems	6
OC 6.	Intellectual Property	6
OC 7.	Information technologies in the system of ensuring the economic security of the state	6
OC 8.	Information Wars	6
OC 9.	IT Law	6
OC 10.	Methods and means of information protection in computer systems	6
OC 11.	Cybersecurity Essentials	6
OC 12.	Programming and administration of the enterprise information system	6
OC 13.	Design of multimedia systems	6
OC 14.	Psychology of adaptation	6
OC 15.	Business psychology	6
OC 16.	WPF application technologies	6
OC 17.	Web resource security technologies	6
OC 18.	Data analysis technologies	6
OC 19.	Management of Sortware Prroducts	6
OC 20.	Philosophy of personality	6
Total of Optional Components		24
Internship		
Internship		10,5
Certification		
Master thesis preparation and public defence		12
Total of Educational Program		90

For all components of the educational program the form of final control is an exam.

2.1. Structural Logic Scheme of Educational Program



3. Form of attestation of applicants for higher education

Attestation is carried out in the form of public defense of qualification work.

The qualifying work must solve a complex problem or problem in software engineering and involve conducting research and/or implementing innovations.

The qualifying work should not contain academic plagiarism, fabrication, or falsification. The qualification work must be published on the official website of the higher education institution or its subdivision, or in the repository of the higher education institution.

The publication of qualifying works with limited access is carried out in accordance with the requirements of the law.

4.1. Matrix of correspondence of program competencies with the compulsory components of the educational program

Components / Competencies	CC 1	CC 2	CC 3	CC 4	CC 5	CC 6	CC 7
GC01		+	+	+	+	+	+
GC02	+	+			+	+	+
GC03		+	+	+	+		+
GC04		+		+			
GC05	+	+	+	+	+		+
SC01			+	+	+	+	+
SC02		+		+	+	+	
SC03				+	+	+	
SC04	+	+		+	+		
SC05				+		+	
SC06				+			+
SC07		+	+	+	+		+
SC08			+	+	+		+
SC09			+		+	+	+

4.2. Matrix of correspondence of program competences with optional components of the educational program

Components / Competencies	OC 1	OC 2	OC 3	OC 4	OC 5	OC 6	OC 7	OC 8	OC 9	OC 10	OC 11	OC 12	OC 13	OC 14	OC 15	OC 16	OC 17	OC1 8	OC 19	OC 20
GC01	+	+	+	+	+	+	+	+	+	+	+	+	+			+	+	+		
GC02	+						+					+	+			+	+			
GC03				+		+	+											+		
GC04		+							+				+	+	+	+			+	+
GC05	+		+	+				+	+		+		+	+	+					+
SC01	+			+								+	+			+		+		
SC02	+			+	+					+								+		
SC03	+				+							+							+	
SC04	+								+			+	+			+				
SC05	+											+					+			
SC06				+					+							+			+	
SC07			+				+	+			+		+					+		
SC08		+																+	+	
SC09	+	+		+												+	+			

5.1. Matrix of correspondence of program learning outcomes (PLO) with relevant compulsory components of the educational program

Components / Program learning outcomes	CC 1	CC 2	CC 3	CC 4	CC 5	CC 6	CC 7
PLO 01	+	+	+	+	+	+	+
PLO 02			+	+	+	+	+
PLO 03	+			+			
PLO 04			+	+	+	+	+
PLO 05		+		+			
PLO 06				+			+
PLO 07		+		+			
PLO 08				+		+	
PLO 09			+		+	+	
PLO 10			+		+	+	
PLO 11		+	+	+	+	+	+
PLO 12		+		+			
PLO 13			+	+		+	
PLO 14		+		+			
PLO 15	+		+	+	+		
PLO 16				+			+

PLO 17	**+**			**+**		**+**	

5.2. Matrix of correspondence of program learning outcomes (PLO) with relevant optional components of the educational program

optional components / program learning outcomes	OC 1	OC 2	OC 3	OC 4	OC 5	OC 6	OC 7	OC 8	OC 9	OC 10	OC 11	OC 12	OC 13	OC 14	OC 15	OC 16	OC 17	OC1 8	OC 19	OC 20
PLO 01	+	+		+	+	+			+	+		+	+			+	+	+		
PLO 02	+			+						+		+	+			+		+	+	
PLO 03							+			+		+	+					+	+	
PLO 04	+			+								+	+			+	+	+		
PLO 05			+					+		+	+	+					+			
PLO 06													+						+	
PLO 07		+										+	+							
PLO 08		+										+	+				+			
PLO 09	+															+				
PLO 10	+															+				
PLO 11	+											+	+			+				
PLO 12					+							+						+		

PLO 13	+								+										+	
PLO 14				+								+						+		
PLO 15	+															+				
PLO 16									+							+				
PLO 17		+	+	+	+	+		+	+	+	+	+	+	+	+			+		+