3. The educational program

Director of the Bachelor's degree programme - S. Rzaeva, PhD in Engineering , Associate Professor of the Department of Software Engineering and Cyber Security

3.1. Profile of the educational program from the Field of study 12 Subject Area 121 "Software Engineering", Educational Programme "Software Engineering", Bachelor's degree

1 – General information	
Full name of the higher educational establishment and structural unit	State University of Trade and Economics Faculty of Information Systems Department of Software Engineering and Cyber Security
Degree of higher education and the name of the qualification in the language of the original	degree of higher education "master" specialty «Software Engineering" specialization «Software Engineering"
The official name of the educational program	«Software Engineering"
Type of diploma and volume of educational program	First (undergraduate) level of higher education (bachelor's , unitary, 240 ECTS credits, term of training – 3 years 10 months
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
Presence of accreditation	Certificate of accreditation, series УД №11007217 dated September 11, 2018, Ministry of Education and Science of Ukraine. Field of knowledge 12 Information technology, specialty 121 Software engineering. The certificate is valid until July 1, 2023, Ministry of Education and Science, Ukraine.
Cycle / Level	NRC Ukraine - 6 level, FQ-EHEA - first cycle, EQF-LLL - 6 level
Prerequisites	Complete general secondary education, initial level of higher education
Language of Training	Ukrainian

Validity of the educational program	4 years / July 1, 2027 (or until the next scheduled update
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 personality capable acquired on the basis of integrated, general and professional competences to work successfully in the field of IT, through the application of scientific and mathematical principles to perform design, analysis, verification, validation, implementation and maintenance of computer software using different programming languages .

3 – Characteristics of the educational program	
Subject area	Object: software, processes, tools and resources for the development, maintenance and quality assurance of software. The goal of training: training of specialists capable of setting and solving tasks related to the development, maintenance and quality assurance of software. Theoretical content of the subject area: basic mathematical, informational, physical, economic provisions regarding the creation and support of software; basics of domain analysis, modeling, design, construction, software support. Methods, techniques, and technologies: software development methods and technologies; collection, processing and interpretation of software engineering research results. Tools and equipment: software, hardware and tools for software development, support and operation.
Orientation of educational program	Educational and professional. Scientific orientation: basic mathematical, informational and economic positions. Professional accents: design, construction, methods and technologies of software development.

The main focus of the educational program and specialization	Special. Higher education in the specialty 121 "Software Engineering" in the field of software. The orientation of the program is based on well-known scientific results, taking into account the current state of IT, programming. Focuses on current specializations, within which further professional and scientific careers are possible: developer (applied) and IT specialists. Keywords: programming, programming languages, technical task, design, development, software testing, software design, software engineering, operating systems.
Features of the program	The program creates the following chain: tasks, knowledge, skills, abilities, professional activity, professional context, work area, interests, professional styles, professional values, related professions, salary. The modular principle is used to reveal the essence of the listed components. The differences are the ability to convert design specifications and problem formulations and procedures into detailed logical schematics designed for coding in a programming language; develop and write computer programs to store, place, and retrieve specific documents, data, and information.
4 – Eligibility of graduates for employment and further training	
Eligibility for employment	Employment at enterprises of various forms of ownership, in public authorities and local governments, public organizations. The specialist may hold primary positions (according to the National Classification of Ukraine: "Classifier of professions" ДК 003: 2010): software engineer; back-end developer; developer applied; computer systems engineer; computer software engineer, as well as QA engineer; web developer; Java developer; software architect (lead software architect), administrators of network and computer systems; network systems and data transmission analysts; operations research analysts
Further education	Continuation of studies at the second (master's) level of higher education in the master's programs in the field of knowledge "Information Technology" master's level 7 NQF of Ukraine, the second cycle FQ-EHEA and level 7 EQF-LLL.
5 – Teaching and assessment	

Teaching and learning	Student-centered learning, self-learning, learning through laboratory practice, problem-based, interactive, project-based, information-computer, self-developing, collective and integrative, contextual learning technologies.
Assessment	Assessment is carried out in accordance with the "Regulations on the organization of the educational process of students", "Regulations on the assessment of learning outcomes of students and graduate students" Types of control: - by levels: self-control, control at the level of the teacher, control at the level of the head of the department, control at the level of the dean's office, control at the level of the rector, certification; Forms of control: oral and written questioning, testing, presentation of scientific work, defense of term papers. Current control, final control - written exams, defense of the final qualification project.
6 – Program competencies	
Integral competence	Ability to solve complex specialized problems or practical problems of software engineering, characterized by complexity and uncertainty of conditions, using theories and methods of information technology.
General competences (GC)[1]	C01. Ability to abstract thinking, analysis and synthesis. C02. Ability to apply knowledge in practical situations. C03. Ability to communicate in the state language both orally and in writing. C04. Ability to communicate in a foreign language both orally and in writing. C05. Ability to learn and master modern knowledge. C06. Ability to search, process and analyze information from various sources. C07. Ability to work in a team.

[1] The general competencies defined by the graduating department are highlighted in italics.

	C08. Ability to act on ethical considerations. C09. The desire to preserve the environment. C10. The ability to act socially responsibly and consciously. C11. The ability to exercise their rights and responsibilities as a member of society, to realize the values of civil (free democratic) society and the need for its sustainable development, the rule of law, human and civil rights and freedoms in Ukraine. C12. Ability to preserve and increase moral, cultural, scientific values and achievements of society based on understanding the history and patterns of development of the subject area, its place in the general system of knowledge about nature and society and in the development of society, techniques and technologies. active recreation and a healthy lifestyle. C13. *Ability to carry out professional activities in accordance with applicable regulations and legal acts.*
Special (professional, subject) competence	C 14. Ability to identify, classify and formulate software requirements. C 15. Ability to participate in software design, including modeling (formal description) of its structure, behavior and functioning processes. C 16. Ability to develop architectures, modules and components of software systems. C 17. Ability to formulate and provide software quality requirements in accordance with customer requirements, specifications and standards. C 18. Ability to adhere to specifications, standards, rules and recommendations on the professional field in the implementation of life cycle processes. C 19. Ability to analyze, select and apply methods and tools to ensure information security (including cybersecurity). C 20. Knowledge of information data models, the ability to create software for data storage, retrieval and processing. C 21. Ability to apply fundamental and interdisciplinary knowledge to solve software engineering problems successfully C 22. Ability to assess and take into account economic, social, technological and environmental factors affecting the sphere of professional activity. C 23. Ability to accumulate, process and systematize professional knowledge on the creation and maintenance of software and recognition of the lifelong learning importance. C 24. Ability to implement phases and iterations of the software systems life cycle and information technology based on appropriate models and approaches to software development. C 25. Ability to carry out the system integration process, apply change management standards and procedures to maintain the integrity, overall functionality and reliability of the software. C 26. Ability to reasonable selection and mastering software development and maintenance tools. C 27. Ability to algorithmic and logical thinking.

7. Program learning outcomes [2]	
	PLO 01. To analyze, purposefully search for and select the necessary information and reference resources and knowledge to solve professional problems, taking into account modern advances in science and technology. PLO 02. To know the code of professional ethics, understand the social significance and cultural aspects of software engineering and adhere to them in professional activities. PLO 03. To know the basic processes, phases and iterations of the software life cycle. PLO 04. To know and apply professional standards and other regulations in the field of software engineering. PLO 05. To know and apply relevant mathematical concepts, methods of domain, system and object-oriented analysis and mathematical modeling for software development. PLO 06. Ability to select and use the appropriate task methodology for creating software. PLO 07. To know and apply in practice the fundamental concepts, paradigms and basic principles of operation of language, instrumental and computational software engineering. PLO 08. To be able to develop a human-machine interface. PLO 09. To know and be able to use methods and tools for collecting, formulating and analyzing software requirements. PL10. To conduct a pre-project survey of the subject area, systematic analysis of the design object. PLO 11. To choose source data for design, guided by formal methods of describing requirements and modeling. PLO 12. To apply effective approaches to software design in practice. PLO 13. To know and apply methods of algorithm development, software design and data and knowledge structures. PLO 14. To apply in practice the tools of domain analysis, design, testing, visualization, measurement and documentation of software. PLO 15. To motivate the choice of programming languages and development technologies to solve problems of software creation and maintenance. PLO 16. To have the skills of team development, approval, design and release of all types of software documentation. PLO 17. To be able to apply methods of component software development. PLO 18. To know and be able to apply information technology processing, storage and transmission of data. PLO 19. To know and be able to apply methods of software verification and validation. PLO 20. To know approaches to evaluating and ensuring software quality. PLO 21. To know, analyze, select, skillfully apply the means of information security (including cybersecurity) and data integrity in accordance with the applied tasks and software systems.

[2] The program learning outcomes determined by the graduating department are highlighted in italics.

	PLO 22. To know and be able to apply methods and tools of project management. PLO 23. To be able to document and present the results of software development. PLO 24. To be able to calculate the economic efficiency of software systems. *PLO 25. To understand and realize their rights and responsibilities as a member of society, to realize the values of a free democratic society, the rule of law, human and civil rights and freedoms in Ukraine.* *PLO 26. To act on the basis of the legislative and regulatory framework of Ukraine and the requirements of relevant standards, including international ones in the field of information and / or cybersecurity.*
8 – Resource support for the implementation of the program	
Personnel provision	Project group: 4 PhDs. Specialists who train bachelors in the educational program "Software Engineering" are full-time employees of the Kyiv National University of Trade and Economics and have professional knowledge and professional skills in the field of software design, development and maintenance. The program involves scientific and pedagogical staff with degrees and / or academic titles, as well as highly qualified practitioners in teaching certain lectures in the disciplines of the training cycle (object-oriented programming, software architecture and design, basics of programming, security information systems and networks). In order to improve their professional level, all scientific and pedagogical workers undergo internships once every five years
Material and technical support	The basis of material and technical support is specialized computer laboratories with modern hardware and software resources that provide quality training for bachelors in the educational program "Software Engineering".
Informational and educational support	The current MOODLE distance learning system and the MS Office 365 environment provide independent and individual work of students.
9 – Academic mobility	
National credit mobility	The organization of credit mobility (except for the 1st year) of bachelors is carried out in accordance with the concluded agreements on academic mobility. Project company "EPAM SYSTEMS", SE "Ukrainian Institute of Intellectual Property", Center for Certified Training "Procom", educational company "Pearson Education", corporation "Parus", group of companies "BGS Solutions".

International credit mobility	The organization of credit mobility (except for the 1st year) of students who obtain a bachelor's degree is realized through the conclusion of agreements on international academic mobility. Project: University of Paris Est Creteil (Paris, France), Audencia Business School (Nantes, France, University of Grenoble Alps (Grenoble, France), University of Central Lancashire (Preston, UK), University Hohenheim (Stuttgart, Germany).
Education for foreign applicants for higher	Conditions and features of the educational program in the context of teaching foreign citizens: knowledge of the Ukrainian language at a level not lower than B1.

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

2.1. List of components of EP

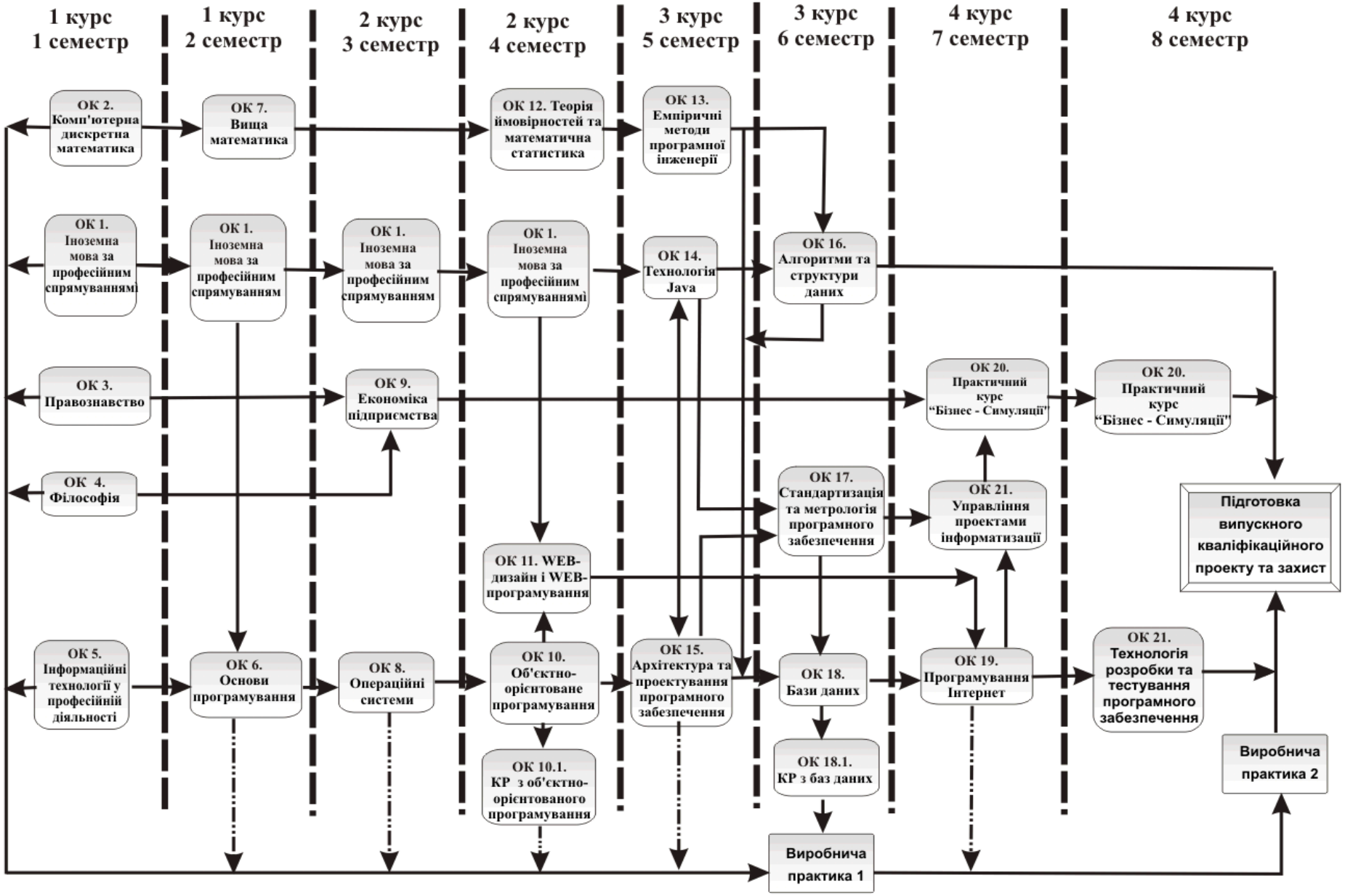
Code e/d	Components of the educational program (academic disciplines, course projects (works), practices, final qualification project)	Number of credits
1	2	3
Compulsory Components of EP		
CC 1.	English for Information Technologies	24
CC 2.	Computer Discrete Mathematics	6
CC 3.	Jurisprudence	6
CC 4.	Philosophy	6
CC 5.	Information technologies in professional activity	6
CC 6.	Basics of programming	6
CC 7.	Higher mathematics	6
CC 8.	Operating systems	6
CC 9.	Economy of Enterprise	6
CC 10.	Object-Oriented Programming	12
CC 10.1	Term Paper on Object-Oriented Programming	
CC 11.	WEB – design and WEB – programming	6
CC 12.	Probability Theory and Mathematical Statistics	6
CC 13.	Empirical Methods of Software Engineering	6
CC 14.	Java Technology	6
CC 15.	Architecture and Software Design	6
CC 16.	Algorithms and Data Structures	6
CC 17.	Software Standardization and Metrology	6
CC 18.	Databases	6
CC 18.1	Term Paper on Databases	
CC 19.	Internet Programming	6
CC 20.	Practical course "Business simulation"	9
CC 21.	Informatization Project Management	6
CC 22.	Software Development and Testing Technology	6
Total of Compulsory Components:		**159**
Elective Components of EP		
EC 1.	Computer Architecture	6
EC 2.	Architecture and technology of mobile application programming	6
EC 3.	Life Safety	6
EC 4.	Security of Information Systems and Networks	6
EC 5.	Diplomatic and Business Protocol and Etiquette	6
EC 6.	Contract Law	6
EC 7.	Expert Systems	6

EC 8.	Electronic Documents Flow	6
EC 9.	Investment Law	6
EC 10.	Business Intelligence Tools	6
EC 11.	Information Wars	6
EC 12.	Information Law	12
EC 13.	History of Ukraine	6
EC 14.	History of Ukrainian Culture	6
EC 15.	Computer Graphics and Data Visualisation	6
EC 16.	Logic	
EC 17.	Human-machine Interaction	6
EC 18.	Mathematical Programming	6
EC 19.	Software Project Management	6
EC 20.	Methods and means of data transmission	6
EC 21.	International Economy	6
EC 22.	Data Models and Structures	6
EC 23.	Modelling of Business Processes	6
EC 24.	Software Modeling and Analysis	6
EC 25.	National interests in world geopolitics and geoeconomics	6
EC 26.	Organization of Computer Networks	6
EC 27.	Basics of Cybersecurity	
EC 28.	Politology	6
EC 29.	EU Law	6
EC 30.	Security psychology	6
EC 31.	Labor Psychology and Engineering Psychology	6
EC 32.	Management Psychology	6
EC 33.	Psychology	6
EC 34.	Religious studies	6
EC 35.	World Culture	6
EC 36.	Data Analysis Technology	6
EC 37.	Startup technology	6
EC 38.	Ukrainian Language for Professional Use	6
EC 39.	Artificial Intelligence	6
Total of Elective Components		**60**
Internship		
Internship 1		6
Internship 2		6
Total		**12**
Attestation		
Preparation for attestation		3

Preparation of Bachelor thesis and defense	6
Total	**9**
Total of Educational Program	**240**

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

2.2. Structural Logic Scheme of Educational Program **---course ---term семестр**



3. Form of attestation of applicants for higher education

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

The qualification work involves the solution of a specialized task or a practical problem of software engineering, characterized by complexity and uncertainty of conditions, using theories and methods of information technology. There can be no academic plagiarism, falsification, or plagiarism in the qualification work.

The qualification work must be published on the official website of the institution of higher education or its division, or in the repository of the institution of higher education. Publication of qualification works containing information with limited access shall be carried out in accordance with the requirements of current legislation.

4.1. Matrix of correspondence of program competences to compulsory components of the educational program

	Components / Competences	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	CC 15	CC 16	CC 17	CC 18	CC 19	CC 20	CC 21	CC 22
General competencies	C 01			+	+		+	+	+			+		+	+	+	+			+			+
	C02						+		+		+			+				+		+			
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	C05				+			+	+		+		+	+	+		+			+			
	C06			+	+	+	+	+			+	+		+	+	+		+	+	+			
	C07										+	+				+						+	
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	C10			+	+																		
	C11			+	+																		
	C12			+	+																		
	C13																				+		
Special (professional, subject) competencies	C14										+	+				+		+		+		+	+
	C15										+	+			+	+						+	
	C16						+		+						+	+							
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	C26											+										+	+
	C27					+	+		+		+				+		+		+	+			

4.2. Matrix of correspondence of program competencies to elective components of the educational program

Components / Competences		EC1	EC 2	EC 3	EC 4	EC 5	EC 6	EC 7	EC 8	EC 9	EC 10	EC 11	EC 12	EC 13	EC 14	EC 15	EC 16	EC 17	EC 18	EC 19	EC 20	EC 21	EC 22	EC 23	EC 24	EC 25	EC 26	EC 27	EC 28	EC 29	EC 30	EC 31	EC 32	EC 33	EC 34	EC 35	EC 36	EC 37	EC 38	EC 39
General competencies	C01				+				+																				+					+						
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	C12					+								+	+											+									+				
	C13						+			+			+															+											
Special (professional, subject) competencies	C14	+			+				+												+															+			
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General competencies	C 01				+			+		+																	+					+								
	C02				+				+	+									+			+		+																
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Special (professional, subject) competencies	C14	+			+					+											+																+				
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5.1. Matrix for providing program learning outcomes 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	CC 8	CC 9	CC 10	CC 11	CC 12	CC 13	CC 14	CC 15	CC 16	CC 17	CC 18	CC 19	CC 20	CC 21	CC 22
PLO 01	+					+				+					+	+						
PLO02			+	+						+												
PLO03					+					+	+			+	+		+					
PLO04					+												+		+		+	
PLO05		+					+	+		+		+	+									
PLO06															+	+						
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PLO26																						

5.2. Matrix for providing program learning outcomes with relevant elective components of the educational program

Components / Program learning outcomes	EC 1	EC 2	EC 3	EC 4	EC 5	EC 6	EC 7	EC 8	EC 9	EC 10	EC 11	EC 12	EC 13	EC 14	EC 15	EC 16	EC 17	EC 18	EC 19	EC 20	EC 21	EC 22	EC 23	EC 24	EC 25	EC 26	EC 27	EC 28	EC 29	EC 30	EC 31	EC 32	EC 33	EC 34	EC 35	EC 36	EC 37	EC 38	EC 39
PL0 1	+			+			+								+	+						+		+		+								+				
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