3. Educational programme

Computer science (Bachelor's degree). Directors of the Bachelor`s degree programme - Kozlov V.V., PhD in Technical Sciences, Associate Professor, Associate Professor of the Department of Computer Sciences and Information Systems

3.1. Profile of the educational programme "Information systems and technologies", Subject Area 126 "Information systems and technologies"

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 Computer Science and Information Systems
Degree of higher educatio and the name of the qualification in the language of the original	The degree of higher education «bachelor» Subject Area "Information systems and technologies"
The official name of the educational programme	"Information systems and technologies"
Compliance with the standard of higher education of the Ministry of Education and Culture of Ukraine	Meets the standards of higher education of the Ministry of Education and Culture of Ukraine
Type of diploma and the volume of the educational programme	Bachelor's degree, single, 240 ECTS credits, term of training 3 years 10 months
Availability of accreditation	Primary accreditation scheduled for 2024
Cycle / Level	NQF of Ukraine – the 6th level, FQ-EHEA –the first cycle, EQF-LLL – the 6th level
Prerequisites	Complete general secondary education
Language(s) of teaching	Ukrainian
The validity of the educational programme	4 years
Internet address of the permanent placement of the educational programme	https:// knute.edu.ua
2 - The purpose of the educational programme	
To provide quality education in the field of information technology necessary for the development, implementation and research of information systems and technologies, formation and development of general and professional competences of information systems and technologies, which ensure the competitiveness of graduates in the labor market. To prepare students with a special interest in the current issues in the field of information technology,	

ready to study the master's programme.	
3 – Characteristics of the educational programme	
Description of the subject region	**Objects of study**: theoretical and methodological foundations and instrumental means of creating and using information systems and technologies; assessment criteria and methods of ensuring quality, reliability, fault tolerance, survivability of information systems and technologies, as well as models, methods and means of optimization and decision-making in the creation and use of information systems and technologies **Learning goals:** formation and development of general and professional competencies in information systems and technologies that contribute to the social stability and mobility of the graduate in the labor market; obtaining higher education for the development, implementation and research of information systems and technologies**.** **Theoretical content of the subject area**: concepts and principles of information management, system integration and administration of information systems, IT project management, enterprise IT infrastructure architecture. Methods, techniques, approaches and technologies of fundamental and applied sciences, modeling. **Tools and equipment:** computer equipment, control and measuring devices, software and technical complexes and tools, network equipment, specialized software, modern programming languages, etc**.**
Orientation of the educational programme	Educational and professional, fundamental, applied
The main focus of the educational programme	Higher education in the field of information technologies, specialty "Information systems and technologies". The main emphasis of the educational programme is on the training of specialists capable of solving complex tasks related to the design, creation and use of information systems and technologies with the use of network technologies and mechanisms of intelligent data analysis, building the architecture of the IT infrastructure of enterprises and the administration of information systems. Keywords: information technologies, informatization, information systems, design of information systems, algorithmization, Machine Learning, Big Data Processing, applied programming technologies, cross-platform programming, programming in C#, C++, Python, Java Script, Android OS, system analysis, management, distributed server systems.
Features of the programme	Availability of a variable component of professionally oriented disciplines for the specialty "Information systems and technologies"; practical training in state institutions, enterprises and organizations. A feature of the educational program "Information systems and technologies" is its content, which takes into account modern trends in the field of information technologies, related to achievements in the field of design and development of network information systems based on network technologies and distributed server systems. In the mandatory components, the feature of the educational programmee is determined by the disciplines "Fundamentals of information systems theory", "Information systems design", "Raid

	data arrays and distributed server systems", "Distributed systems and parallel computing technologies", "Cross-platform programming" , "Corporate network administration systems", "Computer technologies of online startup design and administration", as well as disciplines related to the study of intelligent data processing mechanisms, "Artificial intelligence", "Machine learning", "Pattern recognition systems and image processing".The selective part contains components related to the design and creation of intelligent management systems: "Technologies of presentation and processing of knowledge in intelligent systems", "Architecture of computing systems", "Information systems and technologies in the economy", "Automated design systems", " Technologies of data analysis", "Theory of management in information systems". In the final qualification papers, the subject area related to the development of management information systems in various spheres of trade and economic activity, including, based on intelligent mechanisms of data processing and analysis, is investigated.
4 – Eligibility of graduates to employment and further education	
Eligibility for employment	According to the National Classifier of Types of Economic Activity DK 009:2010, as well as taking into account the requirements of the labor market, the types of professional activity of a graduate are: - activities in the field of informatization - 72; - provision of consultations on informatization issues - 72.1; – development of software and provision of relevant consultations – 72.2 A specialist with an educational degree "bachelor" in the specialty "Information systems and technologies" according to the National Classifier of Professions DK 003:2010 can be employed in positions with the following professional title: 3121.2 Information technology specialist; 3121.2 Computer programme development specialist; 2131.2 System administrator; 213 Professionals in the field of calculations (computerization); 2131 Professionals in the field of computer systems; 2131.2 Developers of computing systems; 2132 Professionals in the field of programming.
Further education	Continuation of studies at the second (master's) level of higher education under the master's educational programmes of the field of knowledge "Information technologies" and under interdisciplinary programmes.
5 – Teaching and assessment	
Teaching and learning	Lectures, practical classes, laboratory work, seminars, self-study using textbooks, manuals and notes, consultations with teachers, preparation of final qualification work. Student-centered approach to learning. Credit and transfer system of training organization. Individual learning trajectory. Problem-oriented learning, self-learning (using library resources and the Internet), learning through practical training. Distance learning using electronic resources.
Assessment	Current control, exams, defense of final qualification work. The evaluation is carried out in accordance with the "Regulations on the

	evaluation of the results of students' and postgraduate studies at SUTE", "Regulations on the organization of the educational process of students"
6 – Programme competences	
Integral competence	The ability to solve complex specialized tasks and practical problems in the field of information systems and technologies, or in the learning process, characterized by complexity and uncertainty of conditions that require the application of theories and methods of information technologies.
General competences	GC 1. Ability to abstract thinking, analysis and synthesis. GC 2. Ability to apply knowledge in practical situations. GC 3. Ability to understand the subject area and professional activity. GC 4. Ability to communicate a foreign language. GC 5. Ability to learn and master modern knowledge. GC 6. Ability to search, process and summarize information from various sources. GC 7. Ability to develop and manage projects. GC 8. Ability to evaluate and ensure the quality of the work performed. GC 9. The ability to realize one's rights and responsibilities as a member of society, to realize the values of a civil (free democratic) society and the need for its sustainable development, the rule of law, the rights and freedoms of a person and a citizen in Ukraine. GC 10. The ability to preserve and multiply moral, cultural, scientific values and achievements of society based on an understanding of 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, use different types and forms motor activity for active recreation and healthy lifestyle.
Special (professional, subject) competences	SC 1. Ability to analyze the object of design or operation and its subject area. SC 2. Ability to apply standards in the field of information systems and technologies when developing functional profiles, building and integrating systems, products, services and elements of the organization's infrastructure. SC 3. Ability to design, develop, debug and improve system, communication and software and hardware of information systems and technologies, the Internet of Things (IoT), computer-integrated systems and system network structure, their management. SC 4. Ability to design, develop and use the means of implementing information systems, technologies and information communications (methodical, informational, algorithmic, technical, software and others). SC 5. The ability to evaluate and take into account economic, social, technological and environmental factors at all stages of the life cycle of information and communication systems. SC 6. Ability to use modern information systems and technologies (production, decision support, intelligent data analysis, and others), cyber security methods and techniques when performing functional tasks and duties. SC 7. The ability to apply information technologies during the

	creation, implementation and operation of the quality management system and to estimate the costs of its development and maintenance. SC 8. Ability to manage the quality of products and services of information systems and technologies during their life cycle. SC 9. Ability to develop business solutions and evaluate new technological proposals. SC 10. Ability to select, design, deploy, integrate, manage, administer and support information systems, technologies and information communications, services and infrastructure of the organization. SC 11. Ability to analyze, synthesize and optimize information systems and technologies using mathematical models and methods SC 12. Ability to manage and use modern information and communication systems and technologies (including those based on the use of the Internet). SC 13. Ability to conduct computational experiments, compare the results of experimental data and obtained solutions. SC 14. Ability to form new competitive ideas and implement them in projects (startups).
7 – Programme learning outcomes	
	PLO 1. Know linear and vector algebra, differential and integral calculus, theory of functions of many variables, theory of series, differential equations for functions of one and many variables, operational calculus, theory of probabilities and mathematical statistics to the extent necessary for the development and use of information systems, technologies and information communications, services and infrastructure of the organization. PLO 2. Apply knowledge of fundamental and natural sciences, system analysis and modeling technologies, standard algorithms and discrete analysis when solving problems of designing and using information systems and technologies. PLO 3. Use basic knowledge of informatics and modern information systems and technologies, programming skills, technologies for safe work in computer networks, methods of creating databases and Internet resources, technologies for developing algorithms and computer programs in high-level languages with the use of object-oriented programming for solving problems of designing and using information systems and technologies. PLO 4. Conduct a system analysis of design objects and justify the choice of structure, algorithms and methods of information transmission in information systems and technologies. PLO 5. Argue the choice of software and technical means for creating information systems and technologies based on the analysis of their properties, purpose and technical characteristics, taking into account system requirements and operating conditions; have skills in debugging and testing software and technical means of information systems and technologies. PLO 6. Demonstrate knowledge of the modern level of information systems technologies, practical programming skills and the use of applied and specialized computer systems and environments with the aim of implementing them in professional activities. PLO 7. To justify the choice of the technical structure and to develop

	the appropriate software that is part of the information systems and technologies. PLO 8. Apply the rules for the design of project materials of information systems and technologies, know the composition and sequence of project work, taking into account the requirements of the relevant regulatory and legal documents for implementation in professional activities. PLO 9. Carry out a system analysis of the enterprise's architecture and its IT infrastructure, develop and improve its elemental base and structure. PLO 10. Understand and take into account social, ecological, ethical, economic aspects, requirements of labor protection, industrial sanitation, fire safety and existing state and foreign standards during the formation of technical tasks and solutions. PLO 11. To demonstrate the ability to develop a technical and economic rationale for the development of information systems and technologies and to be able to evaluate the economic efficiency of their implementation.
8 – Resource support for programme implementation	
Staff support	The implementation of the educational programme is provided by teachers who have the scientific degrees of candidate and doctor of sciences. The participation of foreign specialists and practitioners in the teaching of the disciplines of the cycle of professional training is possible.
Material and technical support	The basis of material and technical support consists of specialized computer laboratories with modern hardware and software resources that ensure high-quality training of bachelors under the educational program "Information Systems and Technologies". Students are fully provided with material resources for study and research. At their service: - more than 30 thousand m2 of educational buildings; - dormitories; - 470 seats in the SUTE reading rooms, including in the SUTE multimedia library, where access to SCOPUS, Web of Science scientometric databases is provided; 2,000 PC workstations with access to the Internet + WiFi. All computer equipment is equipped with basic software, special software is installed on the computers in the laboratories of the departments, necessary for conducting classes and completing tasks by students; - distance learning laboratory, which hosts 966 educational courses; - an electronic platform for student communication based on Microsoft Office 365, etc.
Informational and educational and methodological support	Complete provision with educational and methodological complexes of disciplines and other types of educational and methodological materials. Documents regulating admission and study procedures at SUTE are available on the official website. Open access of higher education seekers to informational and educational-methodical resources through educational process management information

	systems and other web-services: -MOODLE distance learning system (966 educational courses, provides independent and individual training, control), - availability of free access to the Internet and e-mail - information systems "Dean's Office", "Loading-Schedule", management of WEB-resources of SUTE; - library fund management system - almost 1.5 million titles of educational and scientific literature in the SUTE library; - electronic document management system "OPTiMA – WorkFlow"; - corporate information environment in the form of a "personal account" of the user of the SUTE web portal. Ensuring the publicity of information about educational programs, degrees of higher education and qualifications: implementation of the information policy of SUTE, publication on the official website of SUTE of ECTS information packages, educational programmes, the schedule of classes, as well as all components of the provision of the educational process, which are subject to publication in accordance with the Law of Ukraine "On Higher education"; Ensuring an effective system of prevention and detection of academic plagiarism in the scientific works of SUTE employees, students of higher education (checking for plagiarism all graduation qualification papers, publications, publication of the text of dissertation research on the official website of SUTE), compliance with the Code of Ethics of a scientist of Ukraine.
9 – Academic mobility	
National credit mobility	National credit mobility is carried out in accordance with concluded agreements on academic mobility.
International credit mobility	International credit mobility is implemented within the framework of cooperation agreements between SUTE and institutions of higher education in France, Great Britain, Poland, Germany, within the framework of which partner exchange and training are carried out. Studying in the KA1 direction with obtaining credits at universities of member countries of the Erasmus+ Program.
Education of foreign students of higher education	Foreign students of higher education are guaranteed all rights and freedoms in accordance with the current legislation of Ukraine and the University Charter. Education of foreign students of higher education is conducted on general terms with additional language training.

3.2. List of components of the educational programme and their logical sequence

3.2.1. List of EP components

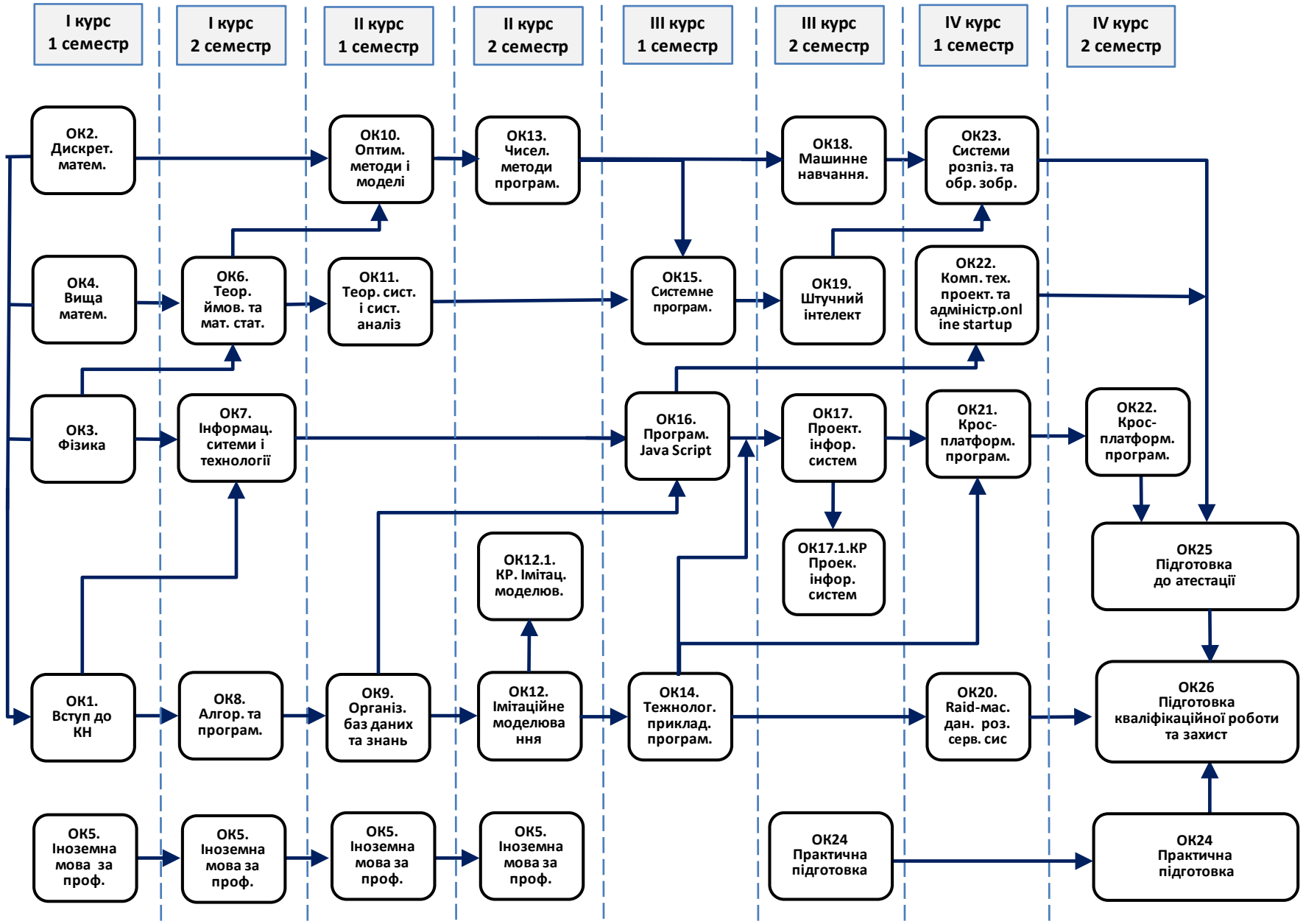
.

Code n/a	Components of the educational programme (educational disciplines, course projects (works), practices, qualifying exam, graduation thesis)	Number of credits
1	2	3
Compulsory components of the EP		
CC 1.	Fundamentals of information systems theory	6
CC 2.	Discrete mathematics	6
CC 3.	Physics	6
CC 4.	Higher mathematics	6
CC 5.	Foreign language for professional use	24
CC 6.	Probability theory and mathematical statistics	6
CC 7.	Information systems and technologies	6
CC 8.	Algorithmization and programming	6
CC 9.	Organization of databases and knowledge	6
CC 10.	Optimization methods and models	6
CC 11.	Systems theory and system analysis	6
CC 12.	Simulation modeling	
CC 12.1	CP on simulation modeling	6
CC 13.	Numerical methods of programming	6
CC 14.	Applied programming technologies	6
CC 15.	System programming	6
CC 16.	Java Script programming	6
CC 17.	Design of information systems	6
CC 17.1	CP on the design of information systems	
CC 18.	Machine learning	6
CC 19.	Artificial Intelligence	6
CC 20.	Raid data arrays and distributed server systems	6
CC 21.	Cross-platform programming	9
CC 22.	Computer technologies of online startup design and administration	6
CC 23.	Pattern recognition systems and image processing	6
CC 24.	Practical training	12
CC 25.	Preparation for certification	3
CC 26.	Preparation of qualifying work and defense	6
The total volume of compulsory components:		**180**
Optional components of the EP		
OC 1.	Architecture of computing systems	6
OC 2.	Life security	6
OC 3.	Vector and tensor analysis	6
OC 4.	Differential equations	6
OC 5.	Economic theory	6
OC 6.	Electronic trade	6

OC 7.	Electrical engineering and basics of electronics	6
OC 8.	Information wars	6
OC 9.	Engineering and computer graphics	6
OC 10.	Information systems and technologies in the economy	6
OC 11.	History of Ukrainian Culture	6
OC 12.	Mathematical logic	6
OC 13.	Management	6
OC 14.	Theory of algorithms	6
OC 15.	Fundamentals of cyber security	6
OC 16.	Legal Studies	6
OC 17.	Psychology	6
OC 18.	Automated design systems	6
OC 19.	Sociology	6
OC 20.	Mobile application development technology	6
OC 21.	Theory of information and coding	6
OC 22.	Technologies of distributed systems and parallel computing	6
OC 23.	Management theory in information systems	6
OC 24.	Business analytics tools	6
OC 25.	Knowledge presentation and processing technologies in intelligent systems	6
OC 26.	Java technology	6
OC 27.	Technologies for creating software products	6
OC 28.	Philosophy	6
OC 29.	Digital systems and technologies	6
OC 30.	Target communicative English language course	
OC 31.	Digital technologies in business	6
OC 32.	Web technologies	
The total volume of optional components:		**60**
TOTAL SCOPE OF THE EDUCATIONAL PROGRAMME		**240**

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

3.2.2. Structural and logical scheme of the educational programme



3.3. Form of certification of applicants of higher education

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

Graduation qualification work involves solving a complex specialized task or a practical problem in the field of modern information systems and technologies, which is characterized by the complexity and uncertainty of conditions and requires the application of theories and methods of information technologies.

There should be no academic plagiarism, falsification and fabrication in the graduation qualification work.

The graduation qualification work must be published on the official website of the institution of higher education or its structural division, or in the repository of the institution of higher education.

3.4. . Matrix of correspondence of programme competences to compulsory components of the educational programme

Components / Competencies	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 12.1	CC 13	CC 14	CC 15	CC 16	CC 17	CC 17.1	CC 18	CC 19	CC 20	CC 21	CC 22	CC 23	CC 24	CC 25	CC 26
GC 1		•	•	•		•				•	•	•	•													•	•	•
GC 2	•	•					•	•	•	•	•			•	•	•	•	•	•			•	•	•		•	•	•
GC 3							•		•	•	•				•	•		•				•	•		•	•	•	•
GC 4					•																							
GC 5			•	•		•	•				•						•	•		•	•			•		•	•	•
GC 6					•		•											•	•	•				•		•	•	•
GC 7																		•	•					•			•	•
GC 8							•								•			•	•					•			•	•
GC 9	•						•																					
GC10	•		•				•																					•
SC 1	•						•			•	•	•	•					•	•			•		•		•	•	•
SC 2							•				•	•						•	•			•	•				•	•
SC 3	•						•	•	•			•			•	•	•	•				•	•	•	•	•	•	•
SC 4	•						•	•	•		•				•	•	•	•	•	•		•	•		•	•	•	•
SC 5	•																	•	•								•	•
SC 6	•						•					•	•							•	•	•	•		•	•	•	•
SC 7											•							•						•			•	•
SC 8																		•	•			•		•			•	•
SC 9																		•	•					•			•	•
SC 10															•			•	•			•				•	•	•
SC 11										•	•															•	•	•
SC 12							•						•				•	•				•	•	•	•	•	•	•
SC 13		•	•	•		•						•		•													•	•
SC 14																		•						•			•	•

3.5. Matrix of correspondence of programme competences to optional components of the educational programme

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	OC 18	OC 19	OC 20	OC 21	OC 22	OC 23	OC 24	OC 25	OC 26	OC 27	OC 28	OC 29	OC 30	OC 31	OC 32
GC 1			•	•								•										•		•		•		•				
GC 2	•		•	•	•	•	•	•		•		•		•	•			•			•	•	•	•	•	•			•		•	•
GC 3	•						•		•	•				•						•			•			•	•				•	•
GC 4																														•		
GC 5	•		•	•						•							•					•				•		•				
GC 6								•		•		•												•								•
GC 7										•																						
GC 8										•																						
GC 9											•					•			•									•				
SC 10		•									•								•									•				
SC 1	•									•		•						•					•	•			•				•
SC 2	•								•	•								•														
SC 3	•									•				•						•			•				•					•
SC 4	•								•	•								•			•		•	•	•		•					•
SC 5	•									•								•					•									•
SC 6										•					•									•	•							
SC 7										•																						
SC 8										•																						
SC 9										•																			•			
SC 10	•									•													•									
SC 11			•	•								•						•				•	•									
SC 12										•										•									•		•	•

SC 13			•	•																	•		•								
SC 14																														•	•

3.6. Matrix of provision of programme learning outcomes with corresponding compuory components of the educational programme

Components / Programme 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 12.1	CC 13	CC 14	CC 15	CC 16	CC 17	CC 17.1	CC 18	CC 19	CC 20	CC 21	CC 22	CC 23	CC 24	CC 25	CC 26
PLO 1		•		•		•								•														•
PLO 2		•	•	•		•		•		•	•	•	•	•				•	•								•	•
PLO 3	•						•	•	•					•	•	•	•	•	•			•	•	•	•	•	•	•
PLO 4							•	•			•							•								•	•	•
PLO 5	•						•	•	•		•				•	•	•	•	•		•	•	•		•	•	•	•
PLO 6	•						•	•	•						•	•	•			•	•	•	•		•	•	•	•
PLO 7	•							•	•		•	•	•		•	•	•	•	•	•	•	•	•			•	•	•
PLO 8																		•	•					•		•	•	•
PLO 9											•											•				•	•	•
PLO 10	•						•											•	•							•	•	•
PLO 11																		•	•					•		•	•	•

3.7. Matrix of provision of programmee learning outcomes with corresponding optional components of the educational programme

Components / Programme 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	OC 18	OC 19	OC 20	OC 21	OC 22	OC 23	OC 24	OC 25	OC 26	OC 27	OC 28	OC 29	OC 30	OC 31	OC 32
PLO 1			•	•								•										•										
PLO 2	•		•	•			•		•			•						•									•					
PLO 3	•						•			•				•						•						•	•					•
PLO 4	•																	•					•									
PLO 5										•					•								•				•					
PLO 6										•				•						•					•	•	•		•			•
PLO 7	•									•								•					•			•	•					•
PLO 8		•								•			•			•																
PLO 9	•									•													•				•					
PLO 10		•			•					•						•	•		•									•				
PLO 11										•			•										•									