

3. Educational program

Information technology and business analysis (Bachelor's degree). The Director of the Bachelor's degree programme V.V. Kulazhenko, PhD in Economics, Associate Professor of the Department of Digital Economy and System Analysis

3.1 Profile of the educational program

| 1 - General information | |
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| Full name of the higher educational establishment and structural unit | State University of Trade and Economics Faculty of Information Technologies Department of Digital Economy and System Analysis |
| Higher education degree qualifications in the original language | Ступінь вищої освіти бакалавр спеціальність «Системний аналіз» |
| The official name of the educational program | «Information technology and business analysis (Data Science)» |
| 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 | Bachelor's degree, unitary, 240 ECTS credits, term of training – 3 year 10 months |
| Presence of accreditation | Initial accreditation was carried out in 2023. |
| Cycle / Level | NRC Ukraine - 6 level, FQ-EHEA - first cycle, EQF-LLL - 6 level |
| Prerequisites | The presence of a complete general secondary education |
| Language (s) Teaching | Ukrainian |
| Validity of the educational program | 4 years |
| Internet address of the permanent placement of the description of the educational program | https://knute.edu.ua |
| 2 – The purpose of the educational program | |
| To provide students with the acquisition of theoretical knowledge and practical skills and abilities sufficient for the successful implementation of complex business analysis, forecasting, optimization and decision-making in complex systems of various nature based on the systematic methodology of Data Science, artificial intelligence, machine learning, other mathematical methods and software tools using modern information technologies, fundamental and applied methods of business analysis to solve problems of data analysis in various fields of science, | |

technology, finance, socio-economic and political spheres, global and local environmental problems and national economy as a whole.

3 – Characteristics of the educational program

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| Subject area | <p>Object: mathematical methods and information technologies of analysis, modeling, forecasting, design and decision-making regarding complex systems of various nature (informational, economic, financial, social, technical, organizational, environmental, etc.).</p> <p>Purpose of training: training of specialists capable of developing and applying methods and tools of system analysis to solve complex problems in various spheres of activity</p> <p>Theoretical content of the subject area: theory of control and decision-making, mathematical and computer modeling, mathematical statistics, data analysis, operations research, optimization of systems and processes.</p> <p>Methods, techniques and technologies: methods of mathematical modeling, data analysis, optimization and operations research, forecasting, risk assessment, management and decision-making theories, game and conflict theory, expert evaluation, sustainable development</p> <p>Tools and equipment: specialized software</p> |
| Orientation of educational program | Educational and professional. Emphasis on readiness to work and acquire skills in information technology, mathematical and computer modeling of data of various nature, forecasting, optimization, system analysis and decision-making, intellectual analysis and synthesis of data and knowledge. |
| The main focus of the educational program and specialization | <p>Special education in the field of business analysis and information technologies, the ability to intellectual analysis, forecasting, decision-making in complex systems of various nature based on the systematic methodology of Data Science.</p> <p>Keywords: data analysis, artificial intelligence, expert systems, machine learning, data from systems of various nature (information, economic, financial, social, political, technical, organizational, environmental, etc.), system approach, system analysis, mathematical modeling, computer modeling, mathematical methods, information systems, information technologies, decision-making, forecasting, business analytics, Data Science.</p> |
| Features of the program | In-depth study and knowledge of promising areas of intellectual data analysis, computer modeling of processes, artificial intelligence systems, expert decision-making systems at various stages of creation and application of information systems. |

4 - Eligibility of graduates for employment and further training

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| Eligibility for employment | <p>Jobs in the field of information technology, communication and IT project management: IT companies, financial companies, consulting companies, government institutions.</p> <p>The list of types of economic activity that a bachelor can perform under the educational program "Information Technologies and Business Analytics (Data Science)":</p> | |
| | Classification of types of economic activity Code 009:2010 | Name of type of economic activity |
| | 62.02 | Consulting on informatization |

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| | 63.11 | Data processing, posting of information on web nodes and related activities |
| | 63.12 | Web portals |
| | Positions that a bachelor can hold under the "Information Technologies and Business Analytics (Data Science)" educational program: | |
| | | Profession name |
| | 1226.2 | Head of the structural division (information protection area) |
| | 2121.2 | Mathematician-analyst for operations research |
| | 2131.1 | Consultant researcher (computer systems) |
| | 2131.2 | Data Manager |
| | 2131.2 | Analyst of the computer data bank |
| | 2149.2 | Analyst of systems |
| | 2412.2 | Analyst in the sphere of professional employment |
| | 2433.1 | Research associate-consultant (information analytics) |
| | 2433.2 | Analyst of consolidated information |
| | 3121 | Specialist in information technologies |
| Further education | Continuation of studies at the second (master's) level of higher education under master's educational programs in the field of knowledge "Information technologies" and interdisciplinary programs close to system analysis.. | |
| 5 – Teaching and evaluation | | |
| Teaching and learning | Problem-oriented training, self-study, training through practical training. | |
| Assessment | Current control, written exams, defense of coursework, defense of 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 – Program competencies | | |
| Integral competence | The ability to solve complex specialized tasks and practical problems of system analysis in professional activities or in the learning process, which involve the application of theoretical provisions and methods of system analysis and information technologies, theories and methods of Data Science, artificial intelligence, machine learning, business analysis, engineering data and are characterized by the complexity and uncertainty of conditions. | |
| General competences (GC) | GS 01. Ability to abstract thinking, analysis and synthesis GS 02. Ability to apply knowledge in practical situations GS 03. Ability to plan and manage time GS 04. Knowledge and understanding of the subject area and understanding of professional activity GS 05. Ability to communicate in the state language orally and in writing GS 06. Ability to communicate in a foreign language GS 07. Ability to search, process and analyze information from various sources GS 08. Ability to be critical and self-critical GS 09. Ability to adapt and act in a new situation GS 10. Ability to work autonomously GS 11. Ability to generate new ideas (creativity) | |

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| | <p>GS 12. Ability to work in a team</p> <p>GS 13. Ability to work in an international context</p> <p>GS 14. Ability to evaluate and ensure the quality of the work performed</p> <p>GS 15. The ability to realize one's rights and responsibilities as a member of society, to be aware of 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.</p> <p>GS 16. 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, technology and technologies, to use various types and forms of motor activity for active recreation and leading a healthy lifestyle.</p> |
| <p>Special (professional, subject) competences (SC)</p> | <p>SC 17. The ability to use system analysis as a modern interdisciplinary methodology based on applied mathematical methods and modern information technologies and focused on solving problems of analysis and synthesis of technical, economic, social, environmental and other complex systems.</p> <p>SC 18. The ability to formalize problems described in natural language, including using mathematical methods, to apply general approaches to mathematical modeling of specific processes.</p> <p>SC 19. The ability to build mathematically correct models of static and dynamic processes and systems with concentrated and distributed parameters, taking into account the uncertainty of external and internal factors.</p> <p>SC 20. The ability to determine the main factors that influence the development of physical, economic, and social processes, to single out stochastic and uncertain indicators in them, to formulate them in the form of random or vague quantities, vectors, processes, and to investigate the dependencies between them.</p> <p>SC 21. The ability to formulate optimization tasks when designing management and decision-making systems, namely: mathematical models, optimality criteria, limitations, management goals; choose rational methods and algorithms for solving optimization and optimal control problems.</p> <p>SC 22. Ability to computerize mathematical models of real systems and processes; design, apply and support modeling, decision-making, optimization, information processing, intelligent data analysis software.</p> <p>SC 23. The ability to use modern information technologies for computer implementation of mathematical models and prediction of the behavior of specific systems, namely: object-oriented approach in the design of complex systems of various nature, applied mathematical packages, application of databases and knowledge.</p> <p>SC 24. Ability to organize work on the analysis and design of complex systems, creation of appropriate information technologies and software.</p> <p>SC 25. Ability to present mathematical arguments and conclusions from them with clarity and precision and in forms suitable for an audience both orally and in writing.</p> |

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| | <p>SC 26. Ability to develop experimental and observational studies and analyze the data obtained in them.</p> <p>SC 27. The ability to systematically analyze one's professional and social activities, to evaluate accumulated experience</p> <p>SC 28. <i>Ability to understand and skillfully use the theory and methods of Data Science.</i></p> <p>SC 29. <i>The ability to develop and implement business analytics problem models using computer simulations.</i></p> <p>SC 30. <i>Ability to use software for data analysis (programming languages, analytical platforms) for the purpose of conducting mathematical and methodological research</i></p> |
| 7 – Program learning outcomes | |
| | <p>PLO 01. Know and be able to apply in practice differential and integral calculus, Fourier series and integral, analytic geometry, linear algebra and vector analysis, functional analysis and discrete mathematics to the extent necessary to solve typical problems of system analysis.</p> <p>PLO 02. Be able to use standard schemes for solving combinatorial and logical problems formulated in natural language, apply classical algorithms for checking the properties and classification of objects, sets, relations, graphs, groups, rings, lattices, Boolean functions, etc.</p> <p>PLO 03. To be able to determine the probability distributions of stochastic indicators and factors affecting the characteristics of the studied processes, investigate the properties and find the characteristics of multidimensional random vectors and use them to solve applied problems, formalize stochastic indicators and factors in the form of random variables, vectors, processes.</p> <p>PLO 04. Know and be able to apply basic methods of qualitative analysis and integration of ordinary differential equations and systems, partial differential equations, including mathematical physics equations.</p> <p>PLO 05. Know the basic principles of the theory of metric spaces, the Lebesgue theory of measure and integral, the theory of bounded linear operators in Banach and Hilbert spaces, apply the technique and methods of functional analysis to solve the problems of managing complex processes under conditions of uncertainty.</p> <p>PLO 06. Know and be able to apply the basic methods of posing and solving problems of system analysis in conditions of uncertainty of goals, external conditions and conflicts.</p> <p>PLO 07. To know the basics of the theory of optimization, optimal management, decision-making theory, to be able to apply them in practice to solve applied problems of management and design of complex systems.</p> <p>PLO 08. To have modern methods of developing programs and software complexes and making optimal decisions regarding the composition of software, algorithms of procedures and operations.</p> <p>PLO 09. Be able to create effective algorithms for computing tasks of system analysis and decision support systems.</p> <p>PLO 10. Know the architecture of modern computer systems and computer networks.</p> <p>PLO 11. Know and be able to apply database and knowledge management systems and information systems in practice.</p> |

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| | <p>PLO 12. Apply methods and means of working with data and knowledge, methods of mathematical, logical-semantic, object and simulation modeling, technologies of system and statistical analysis.</p> <p>PLO 13. Design, implement, test, implement, support, operate software tools for working with data and knowledge in computer systems and networks.</p> <p>PLO 14. Understand and apply statistical modeling and forecasting methods in practice, evaluate raw data.</p> <p>PLO 15. Understand Ukrainian and foreign languages at a level sufficient for processing professional informational and literary sources, professional oral and written communication, writing texts on professional topics.</p> <p>PLO 16. To understand and realize one's rights and responsibilities as a member of society, to be aware of the values of a free democratic society, the rule of law, the rights and freedoms of a person and a citizen in Ukraine.</p> <p>PLO 17. To preserve and increase the achievements and values of society based on the understanding of the place of the subject area in the general system of knowledge, to use various types and forms of motor activity to lead a healthy lifestyle.</p> <p><i>PLO 18. Possess sufficient knowledge of mathematical models and methods of data analysis, modeling languages and software tools for performing practical tasks of business analysis.</i></p> <p><i>PLO 19. To have mathematical methods of developing and researching algorithms for solving business analytics problems, modeling objects and processes, developing algorithms for system functioning.</i></p> |
| 8 – Resource support for the implementation of the program | |
| Personnel provision | <p>Specialists who train bachelors under the educational program "Information technologies and business analytics (Data Science)" must have professional knowledge and professional skills in the field of data analysis, mathematical modeling and modern information technologies.</p> <p>The participation of foreign specialists and practitioners in the teaching of professional training disciplines is possible.</p> |
| Material and technical support | <p>The basis of material and technical support consists of specialized computer laboratories with modern hardware and software resources that provide high-quality training of bachelors under the educational program "Information Technologies and Business Analytics (Data Science)".</p> |
| Informational and educational support | <p>General scientific and special sources of information on system analysis and data analysis, educational and methodological and monographic literature, information resources of the distance learning system and the Internet.</p> |
| 9 – Academic mobility | |
| National credit mobility | <p>National credit mobility is carried out in accordance with concluded agreements on academic mobility.</p> |
| International credit mobility | <p>International credit mobility is implemented by concluding agreements on international academic mobility (Erasmus+), on double graduation, on long-term international projects that involve student training, issuing a double diploma, etc.</p> |

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| Education for foreign students | Conditions and features of the educational program in the context of studying foreign citizens: knowledge of the Ukrainian language at a level not lower than B1. |
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3.2.1 List of components of the educational program and their logical consistency

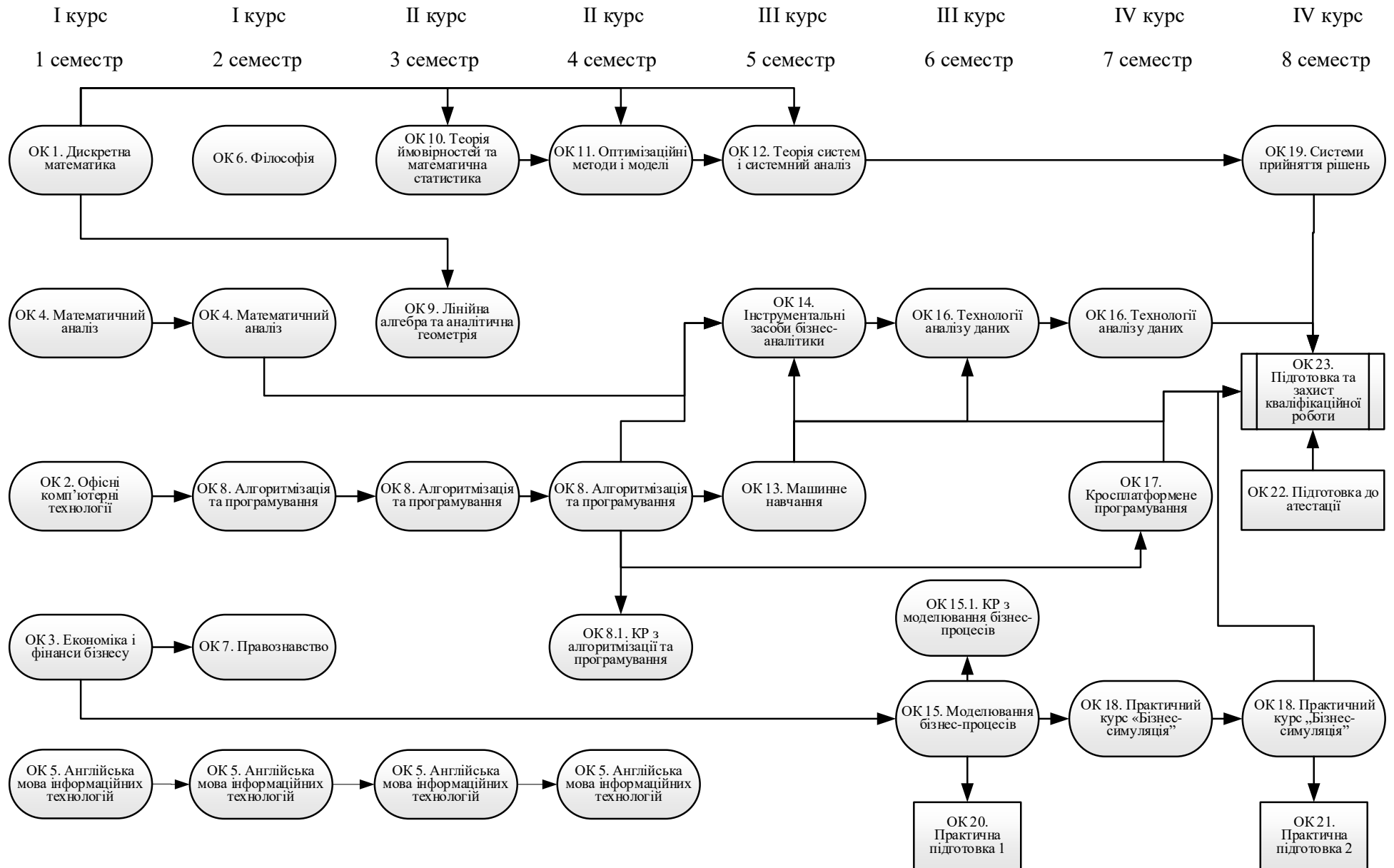
3.2.2. List of components of EP

| Code e/d | Components of the educational program (academic disciplines, course projects (works), practices, qualification exam, final qualifying work) | Number of credits |
|---|---|--------------------------|
| Compulsory Components of EP | | |
| CC 1 | Discrete Math | 6 |
| CC 2 | Office computer technologies | 6 |
| CC 3 | Business economics and finance | 6 |
| CC 4 | Mathematical analysis | 12 |
| CC 5 | English for information technologies | 24 |
| CC 6 | Philosophy | 6 |
| CC 7 | Jurisprudence | 6 |
| CC 8 | Algorithmization and programming | 18 |
| CC 8.1 | Monitoring work on algorithmization and programming | |
| CC 9 | Linear algebra and analytic geometry | 6 |
| CC 10 | Probability theory and mathematical statistics | 6 |
| CC 11 | Optimization methods and models | 6 |
| CC 12 | Systems theory and system analysis | 6 |
| CC 13 | Machine learning | 9 |
| CC 14 | Business analytics tools | 6 |
| CC 15 | Business process simulation | 6 |
| CC 15.1 | Monitoring work on Business process simulation | |
| CC 16 | Technologies of data analysis | 12 |
| CC 17 | Cross-platform programming | 6 |
| CC 18 | Practical course "Business simulation" | 9 |
| CC 19 | Decision-making systems | 6 |
| CC 20 | Internship 1 | 3 |
| CC 21 | Internship 2 | 6 |
| CC 22 | Preparation for the attestation | 3 |
| CC 23 | Preparation of qualifying work and defense | 6 |
| The total volume of compulsory components: | | 180 |
| Elective Components of EP | | |
| EC 1. | Safety of life | 6 |
| EC 2. | Business technologies | 6 |
| EC 3. | Accounting and taxation | 6 |
| EC 4. | Second foreign language | 6 |
| EC 5. | Economic theory | 6 |
| EC 6. | Economic analysis | 6 |
| EC 7. | Simulation modeling | 6 |
| EC 8. | Engineering and computer graphics | 6 |
| EC 9 | Intellectual Property | 6 |
| EC 10. | Internet technologies in business | 6 |

| Code e/d | Components of the educational program (academic disciplines, course projects (works), practices, qualification exam, final qualifying work) | Number of credits |
|-------------------------------------|---|--------------------------|
| EC 11. | Informational law | 6 |
| EC 12. | Information warfares | 6 |
| EC 13. | Information systems and technologies in the economy | 6 |
| EC 14. | History of Ukraine | 6 |
| EC 15. | History of Ukrainian Culture | 6 |
| EC 16. | Computer data visualization systems | 6 |
| EC 17. | Computer technologies of data processing | 6 |
| EC 18. | Cultural heritage of Ukraine | 6 |
| EC 19. | Marketing analysis | 6 |
| EC 20. | Data modeling under uncertainty | 6 |
| EC 21. | National interests in world geopolitics and geoeconomics | 6 |
| EC 22. | Oratory | 6 |
| EC 23. | Organization of computer networks | 6 |
| EC 24. | Cybersecurity basics | 6 |
| EC 25. | Forecasting of socio-economic processes | 6 |
| EC 26. | Project analysis | 6 |
| EC 27. | Psychology | 6 |
| EC 28. | Religious studies | 6 |
| EC 29. | World culture | 6 |
| EC 30. | Strategic analysis | 6 |
| EC 31. | Web application development technologies | 6 |
| EC 32. | Design and administration technology of databases and data storage | 6 |
| EC 33. | Technology for creating distributed databases and knowledge | 6 |
| EC 34. | Ukrainian for specific purposes | 6 |
| EC 35. | Financial analysis | 6 |
| EC 36. | Cloud and GRID technologies | 6 |
| EC 37. | Digital systems and technologies | 6 |
| EC 38. | Numerical methods of programming | 6 |
| EC 39. | Digital technologies in business | 6 |
| EC 40. | Java tools for distributed data processing | 6 |
| Total of Elective Components | | 60 |
| Total of Educational Program | | 240 |

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

3.2.2 Structural Logic Scheme of Educational Program



3.3 Form of attestation of students

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

The qualification work should involve the solution of a complex specialized task or a practical problem of system analysis with the application of theoretical provisions and methods of system analysis and/or information technologies and should be characterized by complexity and uncertainty of conditions.

There can be no academic plagiarism, falsification, or plagiarism in the qualification work.

The qualification work must be posted on the website of the institution of higher education, or its structural subdivision, or the repository of the institution of higher education.

3.4 Matrix of correspondence of program competencies with the compulsory components of the educational program

| Components | | CC 1 | CC 2 | CC 3 | CC 4 | CC 5 | CC 6 | CC 7 | CC 7.1 | CC 8 | CC 9 | CC 10 | CC 11 | CC 12 | CC 13 | CC 14 | CC 15 | CC 15.1 | CC 16 | CC 17 | CC 18 | CC 19 | CC 20 | CC 21 | CC 22 | CC 23 |
|--|-------|------|------|------|------|------|------|------|--------|------|------|-------|-------|-------|-------|-------|-------|---------|-------|-------|-------|-------|-------|-------|-------|-------|
| Competencies | | | | | | | | | | | | | | | | | | | | | | | | | | |
| General competences (GC) | GC01 | + | | + | + | | + | | + | + | + | + | | | + | | + | + | + | + | | + | | | | |
| | GC 02 | | | + | | | | | + | | | + | + | + | + | | + | + | + | + | + | + | + | + | + | + |
| | GC 03 | | | | | | | | | | | + | + | + | | | | | | | | | + | + | + | + |
| | GC 04 | | + | | | | | | | | | | | + | + | | + | | | | | | + | + | + | + |
| | GC 05 | | | | | | | | + | | | | | | + | | | + | | | | | + | + | + | + |
| | GC 06 | | | | | + | | | | | | | | | | | | | | | | | + | + | + | + |
| | GC 07 | + | + | + | + | | | | + | + | + | | | + | + | | | + | + | | | + | | + | + | + |
| | GC 08 | | | | | | | + | | | | | | | | | | | | | | + | | + | + | + |
| | GC 09 | | | | | | | | | | | | | + | | | + | | | | | + | | + | + | + |
| | GC 10 | | + | | | | | | + | | | | | + | | | | + | + | | | + | | + | + | + |
| | GC 11 | | | | | | | + | | | | | | | | | + | | | + | | | + | + | + | + |
| | GC 12 | | | | | | | | | | | | | + | | | | | | | + | + | | + | + | + |
| | GC 13 | | | | | + | | | | | | | | + | | | | | | | | | + | + | + | + |
| | GC 14 | | + | | | | | | | | | | + | | | | | | | | + | | | + | + | + |
| | GC 15 | | | | | | | | + | | | | | | | | | | | | | | | + | + | + |
| | GC 16 | | | | | | | + | | | | | | | | | | | | | | | | + | + | + |
| Special (professional, subject) competences (SC) | SC 17 | | | | | | | | | | | + | | | + | | + | + | | | + | | + | + | + | |
| | SC 18 | + | | | + | | | | + | + | + | + | | + | + | | + | + | | + | + | + | + | + | + | |
| | SC 19 | + | | | + | | | | | + | + | | | | | | | | | | + | | + | + | + | |
| | SC 20 | | | | | | | | | | + | | | | | + | | | | | | + | | + | + | |
| | SC 21 | | + | | | | | | | | | + | | | | | | | | | | + | | + | + | |
| | SC 22 | | + | + | | | | | + | | | | | + | | + | + | + | + | + | + | + | + | + | + | |
| | SC 23 | | + | + | | | | | + | | | + | | + | + | + | + | + | + | + | | + | + | + | + | |
| | SC 24 | | | + | | | | | + | | | | | + | + | | | | + | | | | + | + | + | |
| | SC 25 | + | | | + | | | | | + | + | | | | | | | | | | | | + | + | + | |
| | SC 26 | | | | | | | | + | | | | | | | | | + | + | | | + | + | + | + | |
| | SC 27 | | | | | | | | | | | | | + | + | | | | | | | | + | + | + | |
| | SC 28 | | | + | | | | | + | | | | | + | + | | + | + | | | | + | + | + | + | |
| | SC 29 | | | | | | | | | | | | | + | + | | + | + | | | | + | + | + | + | |
| | SC 30 | | | + | | | | | + | | | | | + | + | | + | + | + | + | | + | + | + | + | |

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

| Components Program learning outcomes | CC1 | CC2 | CC3 | CC4 | CC5 | CC6 | CC7 | CC7.1 | CC8 | CC9 | CC10 | CC11 | CC12 | CC13 | CC14 | CC15 | CC15.1 | CC16 | CC17 | CC18 | CC19 | CC20 | CC21 | CC22 | CC23 |
|---|-----|-----|-----|-----|-----|-----|-----|-------|-----|-----|------|------|------|------|------|------|--------|------|------|------|------|------|------|------|------|
| 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 | | | | | | + | | | | | | | | | | | | | | | | + | + | + | + |
| PLO 18 | + | | | + | | | | | | + | + | | | + | + | + | + | + | | | + | + | + | + | + |
| PLO 19 | | | + | | | | | + | | | | | | | + | + | + | | + | | + | + | + | + | + |

