

### 3. Profile of the educational program in the Subject Area «Information technologies and business analytics (Data Science)»

Information technology and business analyst (master's degree). The director of the educational program is Roskladka A., Doctor of Sciences (Economics), Professor, Professor of the Department of Digital Economy and System Analysis

«Information technologies and business analytics (Data Science)» in the Subject Area 124 «System analysis»

<b>1 – General information</b>	
<b>Full name of the university and the following department</b>	State university of Trade and Economics Faculty of finance and accounting Department of finance
<b>Degree of higher education and title of qualification in the original language</b>	Master's degree Subject Area «System analysis»
<b>Official name of a programme</b>	«System analysis»
<b>Compliance with HESF of the MES of Ukraine</b>	HESF of the MES of Ukraine are in charge
<b>Degree of higher education</b>	Master's degree, single, ECTS credits - 90, training period 16 months
<b>Availability of accreditation</b>	Accredited until 01.07.2028, National Agency for Quality Assurance of Education, Ukraine
<b>Cycle / level</b>	NQF of Ukraine – level 7, FQ-EHEA– second cycle, EQF-LLL– level 7
<b>Background</b>	Bachelor's degree completed
<b>Language(s) of teaching</b>	Ukrainian
<b>Training period</b>	2 years
<b>Internet address of the permanent description of the educational program</b>	<a href="https://knute.edu.ua/">https://knute.edu.ua/</a>
<b>2 – The purpose of educational programme</b>	

Master's training in systems analysis capable of successfully performing complex business analysis in complex systems based on the system methodology of Data Science, mathematical methods and software tools using modern information technologies.

### 3 -The characteristics of the educational programme

<b>Subject area</b>	<p><b>Object of the study:</b> mathematical methods and information technologies of analysis, modeling, forecasting, design and decision-making regarding complex systems of various nature.</p> <p><b>Learning goals:</b> training professionals capable of designing complex information systems, developing new and applying existing methods of system analysis to solve complex problems in various spheres of activity.</p> <p><b>Theoretical content of the subject area:</b> theory of management and decision-making, mathematical and computer modeling of systems and processes, management of IT projects and IT products, data analysis, operations research, system optimization.</p> <p><b>Methods, techniques and technologies:</b> methods of mathematical and computer modeling, intelligent data analysis, artificial intelligence, business analytics, optimization and operations research, forecasting, risk assessment, management and decision-making theory, game and conflict theory, expert evaluation, sustainable development.</p> <p><b>Tools and equipment:</b> specialized software</p>
<b>Orientation of the educational program</b>	<p>Educational and professional. Emphasis on the study of theoretical and practical foundations of mathematical and computer modeling of data of various nature, intellectual analysis and synthesis of data and knowledge.</p>
<b>The main focus of the educational program</b>	<p>Special education in the field of intelligent business analysis in complex systems of various natures based on the systematic methodology of Data Science using information technologies.</p> <p>Keywords: data from systems of various nature (informational, economic, financial, social, political, technical, organizational, environmental, etc.), intellectual data analysis, business analytics,</p>

	information technologies, mathematical modeling, computer modeling, Big Data, Data Science .
<b>Features of the program</b>	In-depth study and knowledge of promising areas of mathematical and computer modeling of processes and systems, information technologies of intellectual data analysis.
<b>4 – Eligibility of graduates to employment and further training</b>	
<b>Suitability for employment</b>	<p>Graduates of the educational program "Information technologies and business analytics (Data Science)" can work in scientific, educational, analytical, IT and other institutions and divisions in positions that require the application of methods of system analysis and data analytics, in professions defined by the National Classifier of Ukraine "Classifier of professions (DK 003:2010)":</p> <p>1238 Project and program managers  2121.2 Mathematician-analyst in operations research;  2131.1 Consultant researcher (computer systems);  2131.2 Computer systems analyst;  2131.2 Data administrator;  2131.2 Computer data bank analyst;  2149.2 Analyst of systems (except computer);  2433.1 Consultant researcher (information analytics);  2433.2 Analyst of consolidated information.  2447 Professional in the field of project and program management.</p>
<b>Further training</b>	<p>Opportunity to continue education to get PhD in the following specialities:</p> <p>121 – Software engineering;  122 – Computer science;  123 – Computer engineering;  124 – System analysis;  125 – Cyber security;  126 - Information systems and technologies..</p>

<b>5 – Teaching and assessment</b>	
<b>Teaching and learning</b>	Problem-oriented learning, self-learning, learning through practical training.
<b>Assessment</b>	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 DTEU", "Regulations on the organization of the educational process of students"
<b>6 – Program competencies</b>	
<b>Integral competence</b>	The ability to solve problems of a research and innovation nature in the field of system analysis, involving the application of the theory and methods of Data Science, business analysis, data and knowledge engineering.
<b>General Competence</b>	GC1. Ability to abstract thinking, analysis and synthesis. GC2. Ability to communicate in a foreign language. GC3. Ability to search, process and analyze information from various sources. GC4. Ability to communicate with representatives of other professional groups at different levels (with experts from other fields of knowledge/types of economic activity). GC5. Ability to develop and manage projects.
<b>Professional competence of the specialty</b>	PC1. The ability to integrate knowledge and carry out systematic research, to apply methods of mathematical and informational modeling of complex systems and processes of various nature. PC2. Ability to design the architecture of information systems. PC3. Ability to develop decision support systems and recommender systems. PC4. Ability to assess risks, develop risk management algorithms in complex systems of various nature. PC5. The ability to model, forecast and design complex systems and processes based on the methods and tools of system analysis.

	<p>PC6. The ability to apply the theory and methods of Data Science to perform intelligent data analysis in order to identify new properties and generate new knowledge about complex systems.</p> <p>PC7. Ability to manage work processes in the field of information technology, which are complex, unpredictable and require new strategic approaches.</p> <p>PC8. The ability to develop and implement scientific and applied projects in the field of information technology and related interdisciplinary projects.</p> <p>PC9. Ability to protect intellectual property rights, commercialize research and innovation results.</p> <p>PC10. Ability to self-education and professional development.</p> <p>PC11. Ability to effectively use the theory and methods of Data Science.</p> <p>PC12. Ability to carry out procedures of research, analysis, systematization and processing of big data.</p> <p>PC13. The ability to develop and implement models of intelligent data analysis tasks using computer simulations.</p>
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**7 – Program learning outcomes**

	<p>PLO 1. Specialized conceptual knowledge that includes modern scientific achievements in the field of systems analysis and information technologies and is the basis for original thinking and conducting research.</p> <p>PLO 2. Build and research models of complex systems and processes using methods of system analysis, mathematical, computer and information modeling.</p> <p>PLO 3. Apply methods of revealing uncertainties in the problems of system analysis, reveal situational uncertainties and uncertainties in the problems of interaction, opposition and conflict of strategies, find a compromise when revealing conceptual uncertainty.</p> <p>PLO 4. Develop and apply methods, algorithms and tools for forecasting the development of complex systems and processes of various nature.</p>
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	<p>PLO 5. Use measures of risk assessment and apply them in the analysis of multifactorial risks in complex systems.</p> <p>PLO 6. Apply methods of machine learning and intelligent data analysis, mathematical apparatus of fuzzy logic, game theory and distributed artificial intelligence to solve complex problems of system analysis.</p> <p>PLO 7. To develop intelligent systems in conditions of loosely structured data of various nature.</p> <p>PLO 8. Identify and evaluate parameters of mathematical models of control objects.</p> <p>PLO 9. Develop and apply models, methods and decision-making algorithms in conditions of conflict, unclear information, uncertainty and risks.</p> <p>PLO 10. Clearly and unambiguously communicate own knowledge, conclusions and arguments to specialists and non-specialists, in particular to people who are studying</p> <p>PLO 11. Freely present and discuss orally and in writing the results of research and innovation, other issues of professional activity in the national and English languages.</p> <p>PLO 12. Develop data and knowledge management models in complex systems.</p> <p>PLO 13. To carry out intelligent analysis and processing of big data by means of computer modeling.</p>
<b>8 – Resource support for the implementation of the program</b>	
<b>Personnel support</b>	<p>Specialists carrying out master's training under the educational program "Information technologies and business analytics (Data Science)" must have specialist 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 disciplines is possible.</p>
<b>Material and technical support</b>	<p>The basis of material and technical support consists of specialized computer laboratories with modern hardware and software resources that provide high-quality training for masters in the educational program</p>

	"Information Technologies and Business Analytics (Data Science)".
<b>Information and teaching methodological support</b>	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.
<b>9 – Academic mobility</b>	
<b>National Credit Mobility</b>	National credit mobility is carried out in accordance with concluded agreements on academic mobility.
<b>International Credit Mobility</b>	International credit mobility is implemented through the conclusion of agreements on international academic mobility (Erasmus+), on double graduation, on long-term international projects that provide for student training, the issuance of a double diploma, etc.
<b>Teaching foreign higher education students</b>	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.

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

### 2.1. List of components of the EP

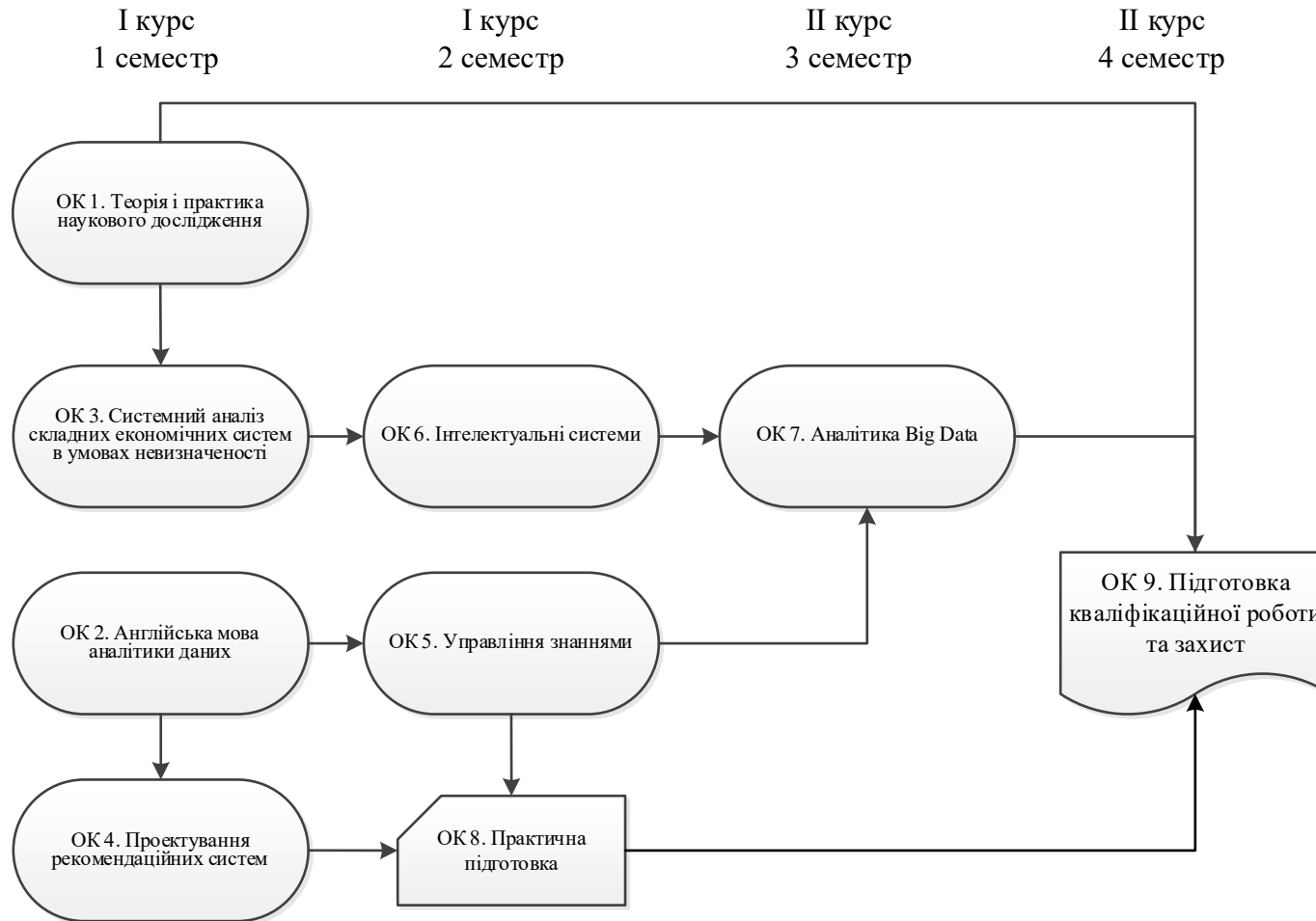
Code of E/D	Components of the educational program (educational disciplines, course projects (work), practice, qualifying examination, graduation work)	Amount of credits
<b>Compulsory components of the EP</b>		
CC1	Theory and Practice of Scientific Research	6
CC2	English Language of Data Analytics	6
CC3	System Analysis of Complex Economic Systems under Conditions of Uncertainty	6
CC4	Design of Recommender Systems	6
CC5	Knowledge Management	7.5
CC6	Intelligent Systems	7.5
CC7	Big Data Analytics	6
CC8	Internship	9
CC9	Preparation of Qualifying Work and Defense	12
<b>Total amount of compulsory components:</b>		<b>66</b>

<b>Elective components of the EP</b>		
EC1	Enterprise Java programming Contract law	6
EC 2	Safety of life	6
EC 3	Security of information systems and networks	6
EC 4	Biometric authentication technologies in information systems	6
EC 5	Contract law	6
EC 6	Information policy of the state	6
EC 7	Information wars	6
EC 8	Cryptographic methods of information protection	6
EC 9	Mathematical methods and models of complex economic systems	6
EC 10	Video information processing methods	6
EC 11	Methods of formalized representation of systems	6
EC 12	Fundamentals of cyber security	6
EC 13	Applied system analysis	
EC 14	Project management software	6
EC 15	Stochastic models in economics	6
EC 16	Internet of Things security technology	
EC 17	Mobile application development technology	6
EC 18	Project management	6
EC 19	Financial ecosystems	6
EC 20	Functional and logical programming	6
<b>Total amount of elective components:</b>		<b>24</b>
<b>TOTAL AMOUNT OF THE EDUCATIONAL PROGRAM</b>		<b>90</b>

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



## 2.2. Structural and logical scheme of the educational program



### **3. Form of attestation of higher education 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 scientific and practical problem of business analytics of a research and/or innovative nature in the field of system analysis with the application of theoretical provisions and methods of Data Science with the use of information technologies.

The qualifying work should not contain academic plagiarism, fabrication, or falsification.

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 the law.

**3.4. THE MATRIX OF COMPLIANCE OF PROGRAM COMPETENCES WITH THE COMPULSORY COMPONENTS OF THE EDUCATIONAL PROGRAM**

Components Competences	C C 1	CC 2	CC 3	CC 4	CC 5	CC 6	CC 7	CC 8	CC 9
GC1	+		+	+		+	+		
GC2		+							
GC3	+		+	+			+	+	+
GC4	+	+			+			+	
GC5				+		+		+	+
PC1	+		+		+	+		+	+
PC 2				+		+		+	+
PC 3				+				+	+
PC 4			+					+	+
PC 5	+		+	+		+		+	+
PC 6				+	+		+	+	+
PC 7	+		+					+	+
PC 8	+					+		+	+
PC 9	+				+			+	+
PC10	+	+						+	+
PC 11				+			+	+	+
PC 12				+			+	+	+
PC 13				+		+	+	+	+

### 3.5. THE MATRIX OF COMPLIANCE OF PROGRAM COMPETENCES WITH THE SELECTIVE COMPONENTS OF THE EDUCATIONAL PROGRAM

Components Competences	EC1	EC2	EC3	EC4	EC5	EC6	EC7	EC8	EC9	EC10	EC11	EC12	EC13	EC14	EC15	EC16	EC17	EC18	EC19	EC20	
GC1									+		+		+		+		+			+	
GC2																					
GC3	+	+	+	+			+	+	+			+		+		+					
GC4	+	+			+	+	+			+			+	+				+	+		
GC5				+						+				+			+	+		+	
PC1	+					+			+		+		+	+	+	+			+	+	
PC2	+		+	+				+								+	+			+	
PC3			+					+					+						+		
PC4		+		+			+		+			+			+			+			
PC5											+		+	+			+	+			
PC6																	+	+		+	
PC7	+		+					+		+					+	+		+			
PC8	+			+		+							+	+	+		+	+	+	+	
PC9					+					+		+							+		
PC10		+				+	+						+						+		
PC11																	+				
PC12				+									+				+				
PC13			+					+	+							+	+			+	

### 3.6. THE MATRIX OF COMPLIANCE OF LEARNING RESULTS WITH THE COMPULSORY COMPONENTS OF THE EDUCATIONAL PROGRAM

Componets Programme learning results	CC1	CC2	CC3	CC4	CC5	CC6	CC7	CC8	CC9
PLO 1	+				+			+	+
PLO 2	+		+		+	+	+	+	+
PLO 3			+	+				+	+
PLO 4			+	+				+	+
PLO 5			+	+				+	+
PLO 6				+		+	+	+	+
PLO 7					+	+		+	+
PLO 8			+				+	+	+
PLO 9			+	+		+		+	+
PLO 10	+	+			+			+	+
PLO 11	+	+						+	+
<i>PLO 12</i>					+		+	+	+
<i>PLO 13</i>				+			+	+	+

### 3.7. THE MATRIX OF COMPLIANCE OF LEARNING RESULTS WITH THE SELECTIVE COMPONENTS OF THE EDUCATIONAL PROGRAM

Compo- nents  Pro- gramme learning results	EC1	EC2	EC3	EC 4	EC5	EC 6	EC7	EC 8	EC9	EC 10	EC11	EC12	EC 13	EC 14	EC 15	EC16	EC 17	EC18	EC 19	EC20
PLO 1	+		+					+					+			+				
PLO 2	+			+		+			+	+	+		+		+	+			+	+
PLO 3				+			+		+				+		+					+
PLO 4			+					+	+		+		+	+				+	+	
PLO 5		+	+	+	+	+	+	+	+			+			+	+		+	+	
PLO 6				+									+				+			+
PLO 7										+	+		+				+			+
PLO 8	+		+					+	+		+			+	+	+			+	
PLO 9									+			+			+			+		+
PLO 10		+			+	+	+							+				+	+	
PLO 11										+			+				+			
<i>PLO 12</i>													+							+
<i>PLO 13</i>				+						+							+			