

BIG DATA MANAGEMENT AND COGNITIVE TECHNOLOGIES

Subject Area F4 System Analysis and Data Science

Field of Knowledge F Information technology

Cycle of Higher Education - Second (Master's)

1. EDUCATIONAL PROGRAMME PROFILE

1- GENERAL INFORMATION	
Full name of the Higher Education Institution and its structural division	State University of Trade and Economics Faculty of Information Technology Department of Digital Economy and System Analysis
The level of higher education and the title of the qualification in the original language	Second (Master's) cycle of higher education Qualification: Master in System Analysis
Discipline	F Information technology
Subject Area	F4 System Analysis and Data Science
Name of the educational programme	Big data management and cognitive technologies
Restrictions on Modes of Study	No restrictions
Compliance with the standard of higher education of the Ministry of Education and Culture of Ukraine	Corresponds to the standard of higher education of the Ministry of Education and Culture of Ukraine (Order No. 331 of March 18, 2021)
Diploma Type and the Educational Programme Volume	Master's degree, single. The volume of the educational and professional programme is 90 ECTS credits. Duration of study is 1 year and 4 months
Accreditation Availability	Certificate of accreditation of specialty UD 3720, valid until 01.07.2028, issued by the Accreditation Commission of the Ministry of Education and Science of Ukraine.
Cycle, level of higher education	NQF of Ukraine – 7th level, QF-EHEA – second cycle, EQF-LLL – 7th level
Prerequisites for admission to the educational programme	Bachelor's degree (NQF level 6) or higher level
Language(s) of training	Ukrainian, English
The term of validity of the educational programme	Until the approval of the new edition of the educational and professional programme
Internet address of the permanent placement of the description of the educational programme	https://knute.edu.ua/
2-THE PURPOSE OF THE EDUCATIONAL PROGRAMME	
Training Masters in System Analysis and Data Science who are capable of successfully managing and analysing big data on the basis of the systemic methodology of Data	

Science, mathematical methods and software tools using modern information technologies.
3-CHARACTERISTICS OF THE EDUCATIONAL PROGRAMME
<i>Subject area</i>
<i>Object:</i> mathematical methods and information technologies for big data management, cognitive technologies, and Data Science technologies in decision-making concerning complex systems of various types. <i>Learning objectives:</i> training professionals capable of designing complex information systems for big data management, developing new methods and applying existing methods of systems analysis to solve complex problems in various fields of activity. <i>Theoretical content of the subject area:</i> theory of management and decision-making, mathematical and computer modelling of systems and processes, management of data-driven IT projects and IT products, big data analysis, cognitive technologies, operations research, and systems optimisation. <i>Methods, techniques and technologies:</i> methods of mathematical and computer modelling, intelligent big 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. <i>Tools and equipment:</i> specialized software.
<i>Orientation of the educational programme</i>
Educational and professional, applied, research
<i>The main focus of the educational programme</i>
Specialised education in the field of intelligent big data analysis in complex systems of various types on the basis of the systemic methodology of Data Science, including their management using cognitive technologies. Keywords: big data, cognitive technologies, data management, data from systems of various types including information, economic, financial, social, political, technical, organisational and environmental systems, intelligent data analysis, information technology, mathematical modelling, computer modelling, Big Data, Data Science.
<i>Features of the programme</i>
In-depth study and knowledge of promising areas of mathematical and computer modelling of processes and systems, and information technologies for intelligent data analysis. Availability of an English-language educational programme.
4 – EMPLOYABILITY AND FURTHER EDUCATION OPPORTUNITIES FOR GRADUATES
<i>Employability</i>
Graduates of the educational programme "Management of big data and cognitive technologies" can work in scientific, educational, analytical, IT and other institutions and departments in positions that require the application of methods of system analysis and data analytics, according to the professions defined by the National Classifier of Ukraine "Occupation Classifier (CO 003:2010)": 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.	
<i>Further education</i>	
Continuation of studies at the third (educational and scientific) cycle of higher education and acquisition of additional qualifications in the adult education system.	
5-TEACHING AND ASSESSMENT	
<i>Teaching and learning</i>	
Problem-oriented learning, self-learning, learning through practical training.	
<i>Assessment</i>	
Evaluation of student learning outcomes is carried out in accordance with the "Regulations on evaluation of learning outcomes of students and graduate students at SUTE" and provides for the following control measures: current and final control, attestation. Current control is carried out in a practical/laboratory session and based on the results of independent work tasks. It provides for the assessment of students' theoretical training during seminar classes and acquired practical skills during the performance of laboratory/practical tasks. Final control consists of control measures that provide for establishing the compliance (measurement, evaluation) of the learning results obtained by a person with the requirements of the educational programme in the part of the relevant educational component, which is carried out at the university in the form of a test and an exam. Study results of students at SUTE are evaluated on a 100-point scale, where: 60-100 points are study results that give the student the right to obtain ECTS credits; 0-59 points – unsatisfactory study results, which do not give the student the right to obtain ECTS credits.	
6-PROGRAMME COMPETENCES	
<i>Integral competence</i>	
The ability to solve problems of a research and/or innovative nature in the field of system analysis.	
<i>General competences (GC)</i>	
GC1	Ability for 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.
<i>Special (professional, subject) competences (SC)</i>	
SC1	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.
SC2	Ability to design the architecture of information systems.
SC3	Ability to develop decision support systems and recommender systems.

SC4	Ability to assess risks, develop risk management algorithms in complex systems of various nature.
SC5	The ability to model, forecast and design complex systems and processes based on the methods and tools of system analysis.
SC6	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.
SC7	Ability to manage work processes in the field of information technology, which are complex, unpredictable and require new strategic approaches.
SC8	The ability to develop and implement scientific and applied projects in the field of information technology and related interdisciplinary projects.
SC9	Ability to protect intellectual property rights, commercialize research and innovation results.
SC10	Ability for self-education and professional development.
SC11	<i>Ability to effectively use the theory and methods of Data Science.</i>
SC12	<i>Ability to carry out procedures for the research, analysis, systematisation and processing of big data using methods of intelligent data analysis and cognitive technologies.</i>
SC13	<i>Ability to develop and implement models of intelligent data analysis tasks using computer simulations.</i>
7-PROGRAMME LEARNING OUTCOMES (LO)	
LO1	To 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.
LO2	To build and research models of complex systems and processes using methods of system analysis, mathematical, computer, and information modelling.
LO3	To 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.
LO4	To develop and apply methods, algorithms and tools for forecasting the development of complex systems and processes of various nature.
LO5	To use measures of risk assessment and apply them in the analysis of multifactorial risks in complex systems.
LO6	To 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.
LO7	To develop intelligent systems in conditions of loosely structured data of various nature.
LO8	To identify and evaluate parameters of mathematical models of control objects.
LO9	To develop and apply models, methods and decision-making algorithms in conditions of conflict, unclear information, uncertainty and risks.
LO10	To clearly and unambiguously convey one's own knowledge, conclusions and arguments to specialists and non-specialists, in particular to people who are studying.

LO11	To freely present and discuss orally and in writing the results of research and innovation, other issues of professional activity in both national and English languages.
LO12	<i>To develop models for managing data and knowledge in complex systems using cognitive technologies.</i>
LO13	<i>To carry out intellectual analysis and processing of big data by means of computer simulation.</i>
8- RESOURCE SUPPORT OF PROGRAMME IMPLEMENTATION	
<i>Staffing</i>	
Specialists carrying out master's training under the educational programme "Big data management and cognitive technologies", must have professional knowledge and professional skills in the field of data analysis, mathematical modelling and modern information technologies. The participation of foreign specialists and practitioners in the teaching of disciplines is possible.	
<i>Material and technical support</i>	
The basis of material and technical support consists of specialized computer laboratories with modern hardware and software resources, which ensure high-quality training of masters according to the educational programme "Big data management and cognitive technologies".	
<i>Informational and educational and methodological support</i>	
An ECTS Information Package is developed for each educational programme at the university. Each student can review and create their own individual plan, view the curriculum, points scored by discipline, class schedule, and communicate with the participants of the educational process through the personal office of the ASU "MIA: Education". Programs, work programs, syllabi of disciplines and evaluation criteria for educational components are posted on the corporate distance learning platform. The electronic repository of the university provides full-text access to scientific and educational literature of SUTE, manuscripts of qualification papers and dissertations for obtaining scientific degrees. For the convenience of higher education recipients, the University has developed a Catalog of academic disciplines, according to which students have the right to choose optional educational components.	
9-ACADEMIC MOBILITY	
<i>National credit mobility</i>	
National credit mobility is carried out within the framework of the signed memorandums of cooperation between SUTE and other institutions of higher education (scientific institutions) of Ukraine in accordance with the legislation.	
<i>International credit mobility</i>	
International credit mobility is implemented through the conclusion of agreements on international academic mobility (Erasmus+), on double graduation, on long-term international projects that involve student training, issuing a double diploma, etc.	
<i>Education of foreign higher education students</i>	

Education of foreign higher education students is carried out in accordance with the requirements of current legislation.

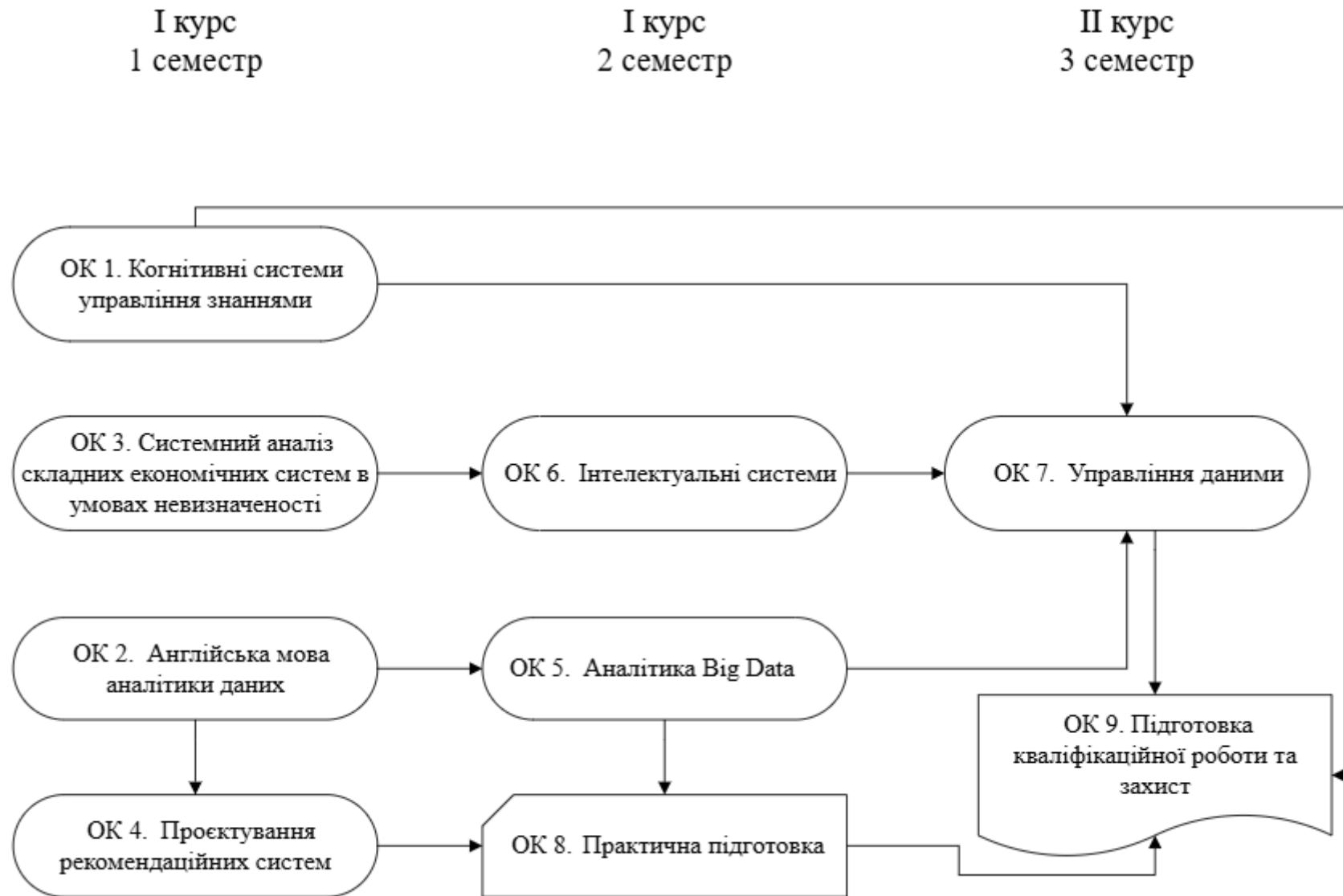
2. LIST OF EDUCATIONAL PROGRAMME COMPONENTS AND THEIR LOGICAL SEQUENCE

2.1. List of EP components

The code	Educational components (EC) of the programme	ECTS credits	Form of control
<i>Compulsory components</i>			
CC 1.	Theory and Practice of Scientific Research	6	Exam
CC 2.	English Language of Data Analytics	6	Exam
CC 3.	System Analysis of Complex Economic Systems Under Conditions of Uncertainty	6	Exam
CC 4.	Design of Recommender Systems	6	Exam
CC 5.	Big Data Analytics	7,5	Exam
CC 6.	Intelligent Systems	7,5	Exam
CC 7.	Data Management	6	Exam
CC 8.	Internship	9	Credit
CC 9.	Preparation of Qualification Work and Defence	12	Defence
The total volume of compulsory components		66	
<i>Elective components</i>			
EC 1.	Educational component 1	6	Exam
EC 2.	Educational component 2	6	Exam
EC 3.	Educational component 3	6	Exam
EC 4.	Educational component 4	6	Exam
Total volume of elective components		24	
TOTAL CREDIT VOLUME OF THE EDUCATIONAL PROGRAMME		90	

Higher education students choose optional academic disciplines through the personal account of the "MIA: Education" portal. The description of the academic disciplines and their prerequisites are presented in the Catalogue of academic disciplines of SUTE.

2.2. Structural and logical scheme of the EP



3. FORM OF CERTIFICATION FOR THE HIGHER EDUCATION STUDENTS

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

The qualification work should involve the solution of a complex problem of a research and/or innovative nature in the field of system analysis. The qualification 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 subdivision, 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.

4. MATRIX OF CORRESPONDENCE OF SOFTWARE 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
GC1			+	+	+	+	+		
GC2		+							
GC3			+	+	+		+	+	+
GC4	+	+						+	
GC5				+		+	+	+	+
SC1	+		+			+	+	+	+
SC2				+		+	+	+	+
SC3				+				+	+
SC4			+				+	+	+
SC5			+	+		+	+	+	+
SC6	+			+	+			+	+
SC7			+					+	+
SC8						+	+	+	+
SC9	+							+	+
SC10		+						+	+
SC11				+	+			+	+
SC12	+			+	+	+	+	+	+
SC13				+	+	+		+	+

5. MATRIX OF ENSURING PROGRAMME LEARNING OUTCOMES BY COMPULSORY COMPONENTS OF THE EDUCATIONAL PROGRAMME

Components Learning outcomes	CC 1	CC 2	CC 3	CC 4	CC 5	CC 6	CC 7	CC 8	CC 9
LO 1	+						+	+	+
LO 2	+		+		+	+	+	+	+
LO 3			+	+				+	+
LO 4			+	+				+	+
LO 5			+	+				+	+
LO 6				+	+	+		+	+
LO 7	+					+		+	+
LO 8			+		+		+	+	+
LO 9			+	+		+		+	+
LO 10	+	+						+	+
LO 11		+						+	+
LO 12	+				+	+	+	+	+
LO 13				+	+		+	+	+

Developed by a working group consisting of:

1. Volodymyr Kulazhenko, PhD in Economics, Associate Professor, Associate Professor of the Department of Digital Economy and System Analysis, **Director of the Educational Programme**
2. Andrii Roskladka, Doctor of Sciences (Economics), Professor, Head of the Department of Digital Economy and System Analysis
3. Oleh Purskyi, Doctor of Sciences (Physics and Mathematics), Professor, Head of the Department of Computer Science and Information Systems
4. Mykola Tsiutsiura, Ph.D. in Technical Science, Professor, Professor of the Department of Digital Economy and System Analysis
5. Anastasiia Kviatkivska, first-year student of Group 6AM, Master's degree level, Faculty of Information Technology, Educational and Professional Programme "Big Data Management and Cognitive Technologies".

Reviews of external stakeholders:

1. Nataliia Rallie – PhD in Economics, Associate Professor, Software Development and Testing Specialist, Omilia Natural Language Solutions UA LLC
2. Olha Luhova, Head of the Public Organization "Ukrainian Association ODOO", business analyst

LIST OF RECOMMENDED ELECTIVE COMPONENTS

The code	Educational components	ECTS credits
EC 1.	Methods of formalized representation of systems	6
EC 2.	Mathematical methods and models of complex economic systems	6
EC 3.	Applied system analysis	6
EC 4.	Stochastic models in economics	6
EC 5.	Mobile application development technology	6
EC 6.	Project management	6

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LETTER OF AGREEMENT
Educational and professional programme and curricula
«Big data management and cognitive technologies»
second (master's) cycle of higher education SUTE

Agreed

The First Vice-Rector for Scientific and Pedagogical work

_____ Nataliia PRYTULSKA
(signature) (name, surname)

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Agreed

Vice-Rector for Scientific and Pedagogical work and International Relations

_____ Anzhelika HERASYMENKO
(signature) (name, surname)

_____ 20 _____

Agreed

Head of the Educational Department of SUTE

_____ Serhii KAMINSKYI
(signature) (name, surname)

_____ 20 _____

Agreed

Head of the Educational and Methodical Department of SUTE

_____ Tatiiana BOZHKO
(signature) (name, surname)

_____ 20 _____

Agreed

Dean of the Faculty of Information Technology of SUTE

_____ Oleksandr KHARCHENKO
(signature) (name, surname)

_____ 20 _____

Agreed

Head of the Department of Digital Economy and System Analysis of SUTE

_____ Andrii ROSKLADKA
(signature) (name, surname)

_____ 20 _____

Agreed

Head of the Specialty Support Group of SUTE

_____ Andrii ROSKLADKA
(signature) (name, surname)

_____ 20 _____

Agreed

Guarantor of the Educational Programme of SUTE

_____ Volodymyr KULAZHENKO
(signature) (name, surname)

_____ 20 _____

Agreed

Head of the Public Organization "Ukrainian Association ODOO", business analyst

_____ Olha LUHOVA
(signature) (name, surname)

_____ 20 _____

Agreed

Software development and testing specialist, "Omilia Natural Language Solutions UA" LLC

_____ Nataliia RALLYE
(signature) (name, surname)

_____ 20 _____

Agreed

A representative of the SGC of the Faculty / Specialty

_____ Diana VASYLCHENKO
(signature) (name, surname)

_____ 20 _____

