NATIONAL UNIVERSITY
OF LIFE AND ENVIRONMENTAL SCIENCES OF UKRAINE

Department of Statistics and Economic Analysis

«APPROVED»
Dean of Economic Faculty,
Anatoliy DIBROVA
"30" 08 2023

«ENDORSED»
on the department of Statistics and Economic Analysis meeting
Record №12 dated on "28" 04 2023
Head of the department
Inna Lazaryshyna

«REWIEVED»
Guarantor of the educational program
«Analytical and accounting and legal business support»
Inna Lazaryshyna

WORK PROGRAM OF THE ACADEMIC DISCIPLINE

"Modeling of Business Processes"

Specialty 071 "Accounting and Taxation"
Educational program "Analytical and accounting and legal business support "
Economic Faculty
Developer **Lesia Voliak,** Associate Professor of the Department of Statistics and Economic Analysis, PhD in Economics, Associate Professor

Kyiv - 2023

1. Description of the discipline Economic and mathematical methods and models

Field of knowledge, specialty, educational program, educational degree		
Educational degree	Bachelor	
Specialty	071 "Accounting and Taxation"	
Educational program	Analytical and accounting and legal business support	
Characterization of discipline		
Type	Mandatory	
Total number of hours	120	
Number of ECTS credits	4	
The number of structural modules	2	
Course project (work) (if your curriculum)		
Form of control	Exam	
Indicators of discipline for full-time and distance learning		
	full-time education	distance education
Year of training	3	
Semester	5	
Lectures	15 hours	
Practical, seminars	30 hours	
Laboratory studies	- hours	
Independent work	75 hours	
Individual tasks	hour	
The number of weekly hours for full-time study: classroom	3 hours	

2. The purpose and objectives of the study discipline

Methodological aspects of economic and mathematical modeling, conceptual provisions, models and methods of optimization problems, basics of systems analysis are considered.

The purpose of the discipline "Modeling of Business Processes " is to form a system of special knowledge and practical skills in the field of knowledge formation on methodology and tools of construction, as well as adequate use of different types of economic and mathematical models and methods.

The subject of the discipline "Modeling of Business Processes " is the methodology and tools of economic-mathematical modeling and analysis of economic objects, processes, phenomena, trends and cause-and-effect relationships in economics; theoretical and practical issues of economic and financial risk analysis.

The main objectives of the discipline "Modeling of Business Processes " are students to learn the basic principles and tools for setting problems, basic methods of solving and analyzing them for widespread use in economics and business.

The discipline provides the formation of a number of competencies:

Integral competence:

Ability to solve complex specialized tasks and practical problems in the field of accounting, auditing, analysis and taxation in the process of professional activity, which involves the application of theories and methods of economics and is characterized by complexity and uncertainty of conditions.

General competencies:

ЗК 1. Ability to learn and be ready to learn and apply the acquired knowledge.

ЗК 2. Ability to analyze and synthesize as a tool for identifying problems and making decisions to solve them based on logical arguments and proven facts.

ЗК 4. Appreciation and respect for diversity and multiculturalism.

ЗК 7. Ability to think flexibly and competently apply the acquired knowledge in professional activities.

ЗК 8. Ability to communicate in state and foreign languages both orally and in writing.

ЗК 11. Ability to present the results of research.

ЗК 13. Ability to conduct research at the appropriate level.

Special (professional) competencies:

ФК 1. Ability to study trends in economic development using the tools of macro- and microeconomic analysis, to make generalizations on the assessment of the manifestation of certain phenomena that are inherent in modern processes in the economy.

ФК 2. Use mathematical tools to study socio-economic processes, solving applied problems in the field of accounting, analysis, control, audit, taxation.

ФК 11. The ability to control compliance with regulatory acts on accounting methodology and the system of taxation, preservation and efficient use of resources.

Program learning outcomes:

ПРН 1. Demonstrate basic knowledge and understanding of economic categories, laws, causal and functional relationships that exist between processes and phenomena at different levels of economic systems.

ПРН 14. Demonstrate mastery of general scientific and special methods of researching economic phenomena and processes at the enterprise.

ПРН 15. Possess and apply knowledge of a foreign language for the formation of business papers and communication in professional activities.

ПРН 18. Analyze the development of accounting systems, models and methods at the national and international levels in order to substantiate the feasibility of their introduction at the enterprise.

3. Structure of the discipline

CONTENT MODULE 1. Conceptual aspects of economic and mathematical modeling

Topic 1. Theoretical foundations of mathematical modeling and classification of models

Economic and mathematical modeling is one of the effective methods of describing the functioning of complex socio-economic objects and processes in the form of mathematical models, thus combining economics and mathematics.

Topic 2. Principles and stages of construction of economic and mathematical models

To build a set of interconnected economic and mathematical models, as well as any individual model, you need a set of principles (rules of the game) that allow you to correctly carry out the process of formalizing modeling systems and objects. The general principles of economic and mathematical modeling follow from the general foundations of systems analysis, ie they should be answers to the questions: 1) what should be done? 2) when should it be done? 3) with whose help should it be done? 4) on the basis of what information are the relevant actions taken? 5) what result should be obtained on the basis of these actions?

Topic 3. The main methods of formalizing economic conditions

Modeling techniques. Target setting of the problem, indicator of optimization criterion, target function. The concept of limiting economic and mathematical problems, their classification. Basic methods of formalization of constraints (conditions) of problems: at the set coefficients at unknown and volumes of restrictions; with varying amounts of restrictions; reception of the "reflected" variable; conditions of proportional communication; under the condition of changing technical and economic coefficients for unknown problems, the method of summation coefficients.

Topic 4. The general problem of linear programming and its canonical figures

Peculiarities of linear programming problems and their application in the national economy are shown.

The concept of the general problem of linear programming is given. An expanded, vector-matrix record of the general problem of linear programming is given. The concepts of basic and natural constraints, matrices of basic conditions are introduced. Basic analytical properties of linear problems programming

Definition of the reference plan of the linear programming problem and its consequences (the concept of degeneracy and nondegeneracy of the reference plan). Hard and non-hard limits. Figures (forms) of linear programming problems. Transition rules and examples. Two ways to eliminate variables that are unlimited by sign.

CONTENT MODULE 2. Fundamentals of the theory of methods optimization

Topic 5. Geometric interpretation tasks linear programming

The concept of n - measurable space (the main variables of the linear problem programming). Geometric interpretation of constraints-equations and constraints-inequalities. The concept of normal vector (gradient vector, guide vector). Interpretation of the linear form (objective function) of the problem as a level line or level hyperplane. Finding extreme points. Finding solutions to linear programming problems.

Topic 6. Solution of ZLP simplex method and its modifications

The idea of the simplex method is to search for the vertices of a polygon (polyhedron) of plans for a linear programming problem in a purposeful direction. Theorem on finiteness of vertices of a polyhedron of problem plans. Simplex - means simple (from Latin). The main requirement of the simplex method for linear programming problems is that the problems must be written in a standard (first canonical figure).

Determination of basic, reference, optimal plan of linear programming problem. Rules for building basic, reference, optimal plans. Signs of support and optimality.

Topic 7. Distribution problems of linear programming

Methods of construction of initial plans: north-western corner, minimum element, double marks.

Application of the potential method to find the optimal plans of the vehicle. Features of solving open transport problems and problems with degenerate plan. Transport problem as a variety of distribution tasks. Distribution tasks are considered and examples of their application in the national economy are given. The statement of the transport problem is given. The concept of balance condition. The issues of closed transport tasks (tasks with the right balance) are considered.

Algorithm of potential method, its phasing: construction of potential system on the basis of the first potential condition, check of plans for fulfillment of the second condition of potentiality, construction of cycle, choice of value change of plan, change of plan, change of system of potentials.

Topic 8. Economic and mathematical analysis of solutions of optimization problems

The given theorems of duality allow to use the solution of double tasks (double estimates, objectively due to estimates) for analysis optimal plan of the direct problem. Thus, if the value of the double score is non-zero - it means that the production resource is limited, limits the further increase of production, and - the greater the value of the double score, the more limited the resource.

Topic 9. The system of models in the study of production processes of the agricultural sector of the economy

The application of modeling methods will be shown on the examples of development of optimization models for livestock, crop production, as well as intersectoral balance, namely feeding rations of farm animals and making optimal plans for the use of fodder harvested for the stall period.

Topic 11. Applied optimization models. Production models

Models of consumer behavior (Behavioral models in the study of operations). Models of behavior of producers (Resource theory and production functions in the study of operations).

Topic 12. Applied financial models

Consider financial management as an object of mathematical modeling. Scope of competence of the financial manager and the possibility of formalizing financial tasks. Features of the formation of financial markets in Ukraine. Risk in the field of financial management. Risk measurement. Economic and mathematical models of optimization of the monetary system: the model of the monetary multiplier, the model of the monetary base, the model of estimating the impact of inflation on the dynamics of% rates. Investment optimization model priorities.

The structure of the discipline

Tames of content modules and topics	Number of hours											
	Full-time						Correspondence form					
	total	including					total	including				
		l	lb	p	ind			l	n	lb	ind	
1	2	3	4	5	6	7	8	9	10	11	12	13
Content module 1. Conceptual aspects of economic and mathematical modeling												
Topic 1. Theoretical foundations of mathematical modeling and classification of models	9	1		2	6							
Topic 2. Principles and stages of construction Economic mathematical models	9	1		2	6							
Topic 3. Basic methods of formalizing economic conditions	10	2		2	6							
Topic 4. The general problem of linear programming and its canonical figures	10	2		2	6							
Topic 5. Geometric interpretation of linear programming problems	9	1		2	6							
Topic 6. The solution of simplex method and its modifications	9	1		2	6							
Topic 7. Theory of duality and duality of linear optimization estimates tasks	12	2		4	6							
Together on the content module 1	68	10		16	42							
Content module 2. Fundamentals of theory and methods optimization												
Topic 8. Transport problems of linear programming	11	1		4	6							
Topic 9. Analysis of optimization solutions tasks	10	1		2	7							

Topic10. Mathematical modeling of the agricultural industry	9	1		2	6							
Topic 11. Applied financial models. Production models	10	1		2	7							
Topic 12. Applied financial models	12	1		4	7							
Together on the content module 2	52	5		14	33							
Total hours	**75**	**15**		**30**	**75**							

4. Practical topics

№ s/n	Name topics	Number of hours
1	Mathematical formalization of problem conditions.	2
2	Study of applied programs for solving economic and mathematical problems on an Excel spreadsheet	2
3	Modeling techniques.	2
4	Modeling of the optimal ration of agricultural feeding animals	2
5	Modeling of optimal sowing structure	2
6	Examples of problems	2
7	Examples of athematic programming problems. Canonical figures of ZLP. Transformation of one figure to another.	4
8	Geometric interpretation and graphical solution of ZLP.	4
9	Methods of constructing initial plans of the transport problem	2
10	Construction of the optimal plan of the transport problem	2
11	Construction of dual problems. PDZ geometry.	2
12	The main features of ZNLP. Integer programming problems. Practical implementation on a PC	4
	Total:	***30***

5. Self-Study Work

№ s/n	Name topics	Number of hours
1	Mathematical formalization of problem conditions.	6
2	Study of applied programs for solving economic and mathematical problems on an Excel spreadsheet	6
3	Modeling techniques.	6
4	Modeling of the optimal ration of agricultural feeding animals	6
5	Modeling of optimal sowing structure	6
6	Examples of problems	6
7	Examples of athematic programming problems. Canonical figures of ZLP. Transformation of one figure to another.	6
8	Geometric interpretation and graphical solution of ZLP.	6

9	Methods of constructing initial plans of the transport problem	7
10	Construction of the optimal plan of the transport problem	6
11	Construction of dual problems. PDZ geometry.	7
12	The main features of ZNLP. Integer programming problems. Practical implementation on a PC	7
	Total:	75

6. Test questions, sets of tests to determine the level of knowledge acquisition by students.

Control questions

1) Write a general mathematical model of linear programming problems.
2) How to reduce the problem of linear programming to the canonical form?
3) What are the forms of recording linear problems programming?
4) Explain the geometric interpretation of the problem of linear programming.
5) What solution to the problem of linear programming is called empty?
6) Explain what is called the range plans.
7) What is the plan called supporting?
8) What reference plan is called degenerate?
9) What tasks of linear programming can be solved graphically method?
10) Under which conditions the problem of linear programming with an unlimited area of valid plans has the solution?
11) The essence of the algorithm of the graphic method for solving linear programming problems.
12) Simplex is used to solve some mathematical problems method?
13) The essence of the algorithm of the simplex method.
14) Formulate the conditions for the optimality of solving the problem by the simplex method.
15) How to choose a solver element?
16) Give an economic interpretation of direct and dual linear programming problems.
17) How to determine that a resource is in short supply (deficient)?
18) How to determine that production is profitable (not profitable)?
19) Describe the economic and mathematical formulation of classical transport tasks.
20) How does the transport problem differ from the general linear problem programming?
21) Formulate the necessary and sufficient conditions for the existence of the transport interchange tasks.
22) What properties do you know about the reference plans of the transport problem?
23) Than is different open transport problem from closed?
24) How to turn an open transport task on closed?
25) What methods do you know to build a reference plan?
26) What means "degeneracy" reference plan? How him get rid of?
27) Name the stages of the method algorithm potentials.

28) As calculated potentials?
29) Name the conditions for optimal transport tasks.
30) Difficulties in solving nonlinear problems programming.
31) What is the problem of mathematical programming called integer?
32) Give examples of economic problems related to integers.

Examples of tests

NATIONAL UNIVERSITY OF BIORESOURCES AND NATURE MANAGEMENT OF UKRAINE			
OS Bachelor **specialty** Accounting and taxation	**Department of** Statistics and Economic Analisys	**EXAMINATION TICKET № 1** discipline Economic and Mathematical Methods and models	Head departments _____ Lazaryshyna I.D.

Exam questions (maximum score of 10 points per answer to the question)

Task 1. Find the solution of an integer problem: (7 points)

$$z = x_1 - 2x_2 \to max$$
$$x_1 - 2x_2 \le 1$$
$$x_1 + x_2 \le 5$$
$$x_1 \ge 0,\ x_2 - \text{integer} \ge 0$$

Task 2. Method of potentials for solving transport problems.

1. Pass the final certification test on the electronic course https://elearn.nubip.edu.ua/course/view.php?id=1029

Exam questions
(maximum score of 10 points for answering the question)

Task. Which of the plans transport task changed correctly?

Initial plan:

	1 -	3 -	5 10	**10**	
	4 25	2 15	4 -	**40**	
	2 -	4 20	9 10	**30**	
	25	**35**	**20**	**80**	

1) $X = \begin{pmatrix} 0 & 0 & 0 \\ 15 & 25 & 0 \\ 0 & 10 & 20 \end{pmatrix}$ 2) $X = \begin{pmatrix} 0 & 10 & 0 \\ 25 & 15 & 0 \\ 0 & 10 & 20 \end{pmatrix}$

3) $X = \begin{pmatrix} 0 & 0 & 10 \\ 5 & 35 & 5 \\ 0 & 20 & 0 \end{pmatrix}$ 4) $\begin{pmatrix} 0 & 5 \\ 20 & 0 \\ 15 & 15 \\ 0 & \end{pmatrix}$

5) $X = \begin{pmatrix} 0 & 0 & 10 \\ 0 & 35 & \\ 5 & 0 & \\ & & 20 \end{pmatrix}$

Task 2. Transition from the general problem of LP to standard.

Exam questions
(maximum score of 10 points for answering the question)

Task 1 The problem is built dual. Which one is correct?

$z \to 2x_1 + 3x_2 \to \max$ $3x_1 + 4x_2 \le 512$ $5x_2 + 8x_1 \le 212$ $2x_2 \le 3$ $x_1 \ge 0, x_2 \ge 0$	$w = 5y_1 + 8y_2 \to \min$ $w = 5y + 8y \to \min$ $w = 5y_1 + 8and_2 + 3and_3 \to \min$ **1)** $3y_1 + 12y_2 + y_3 \ge 2$ **2)** $3y_1 + 12y_2 + y_3 \ge 2$ **3)** $3y_1 + 12y_2 + y_3 \ge 2$ $4y_1 + 5and_2 + 2and_3 \ge 3$ $4y_1 + 5and_2 + 2and_3 \ge 3$ $4y_1 + 5and_2 + 2and_3 \ge 3$ $y_1 \ge 0, y_2 \ge 0, y_3 \ge 0$ $y_1 \ge 0, y_2 \ge 0, y_3 \ge 0$ $y_1 \ge 0, y_2 \ge 0, y_3 \ge 0$ $w = 5y_1 + 8and_2 \to \min$ $w = 5y_1 + 8y_2 \to \min$ **4)** $3y_1 + 12y_2 + and_3 \ge 2$ **5)** $3y_1 + 12y_2 + y_3 \ge 2$ $4y_1 + 5and_2 + 2and_3 \ge 3$ $4y_1 + 5and_2 + 2and_3 \ge 3$ $y_1 \ge 0, y_2 \ge 0, y_3 \ge 0$ $y_1 \ge 0, y_2 \ge 0, y_3 \ge 0$

2. The idea of the simplex method.

Exam questions
(maximum score of 10 points for answering the question)

Task 1. Solve the transport problem:

8 46 2

AND **20,40,50** ***B*** **30,15,18,47** ***C*** **7 65**

3

5 647

Task 2. Statement of the problem of optimization of transport traffic.

Exam questions
(maximum score of 10 points for answering the question)

Task 1. MZhV. Which of the transformations is true and appropriate?

Z →
max

	-x 1	**-x 2**	**b**
X 3 =	**-1**	**-2**	**2**
X 4 =	**4**	**-3**	**4**
X 5 =	**-2**	**1**	**3**
Z =	**-4**	**2**	**5**

1

	-x 4	**-x 2**	**b**
X 3 =	**0**	**11/4**	**3**
X 1 =	**1**	**3/4**	**1**
X 5 =	**0**	**1/2**	**5**
Z =	**0**	**1**	**9**

2

	-x 4	**-x 2**	**b**
X 3 =	**-1/4**	**11/4**	**3**
X 1 =	**1/4**	**-3/4**	**1**
X 5 =	**-1/2**	**-1/2**	**5**
Z =	**-1**	**-1**	**9**

3

	-x 4	**-x 2**	**b**
X 3 =	**1/4**	**-11/4**	**3**
X 1 =	**1/4**	**-3/4**	**1**
X 5 =	**1/2**	**-1/2**	**5**
Z =	**1**	**-1**	**9**

4

	-x 4	**-x 2**	**b**
X 3 =	**-1/4**	**-11/4**	**3**
X 1 =	**-1/4**	**-3/4**	**-1**
X 5 =	**-1/2**	**-1/2**	**5**
Z =	**-1**	**-1**	**9**

2. Property of reference plans of the transport task

Exam questions
(maximum score of 10 points for answering the question)

Task 1.

Two tasks are constructed for the problem. Which one is correct?

Assigned task	
$z \square\square 4 x_1 \square\square 8 x_2 \square\square \max$ $\square 3x_1 \square 4x_2 \square 2\,12 x_1 \square 5$ $x_2 \square\square 4 x_1 \square 2 x_2 \square 3$ $x_1 \square\square 0, x_2 \square\square 0$	$w \square 2y_1 \square 4 and_2 \square \min$ $w \square 2y_1 \square 4 and_2 \square\square \min$ **1.** $\square 3 y_1 \square\square 12 y_2 \square and_3 \square 4$ 2. $\square 3 and_1$ $\square\square 12 y_2 \square and_3 \square 4$ $4y_1 \square 5 and_2 \square 2 and_3 \square 8$ $4y_1 \square 5 and_2 \square 2 and_3 \square 8$ $y_1 \square\square 0, y_2 \square\square 0, y_3 \square 0$ $y_1 \square\square 0, y_2 \square\square 0, y_3 \square 0$ $w \square 2y_1 \square 4 and_2 \square 3 and_3 \square \min$ $w \square 2y_1 \square 4y_2 \square \min$ 3. $\square 3 y_1 \square\square 12 y_2 \square y_3 \square 4$ 4. $3 y_1 \square\square 12 y_2 \square y_3 \square 4$ $4y_1 \square 5 and_2 \square 2 and_3 \square 8$ $4y_1 \square 5 and_2 \square 2 and_3 \square 8$ $y_1 \square\square 0, y_2 \square\square 0, y_3 \square 0$ $y_1 \square\square 0, y_2 \square\square 0, y_3 \square 0$

Task 2. In open and closed vehicles. Theorem on the existence of a TK solution.

Exam questions
(maximum score of 10 points for answering the question)

Task 1. Which of the potential systems is correct for the following plan of the transport task?

	6 10 | 4 - | 3 - 2 15 | 4 5 | 5 - 3 - | 2 8 | 4 7
1	$u_1 = 7; u_2 = 3; u_3 = 2; v_1 = -1; v_2 = 0; v_3 = 2;$
2	$u_1 = 0; u_2 = -4; u_3 = -6; v_1 = 6; v_2 = 8; v_3 = 10;$
3	$u_1 = 4; u_2 = 0; u_3 = -1; v_1 = 2; v_2 = 4; v_3 = 5;$
4	$u_1 = 5; u_2 = 2; u_3 = 0; v_1 = 0; v_2 = 2; v_3 = 4;$
5	$u_1 = 3; u_2 = 0; u_3 = 2; v_1 = 2; v_2 = 4; v_3 = 2.$

Task 2. Geometric interpretation of the simplex method.

7. Methods teaching

Information and reporting with elements of problem and clarity, problem solving, situational problem solving, documentation, work with electronic resources and software for solving optimization problems etc.

8. Forms control

Control measures include current and final control of student knowledge. Current control is carried out during the practical classes and in the course of seminars on the methods: rapid survey, testing, solving problems that are provided in each practical lesson.

9. Distribution of points received students

Student assessment is carried out in accordance with the provisions of "On examinations and tests in NULES of Ukraine" from 26.04.2023, protocol № 10 of table.

Grading scale

Evaluation on the scale	Total points for all activities
excellent	90 – 100
good	74 – 89
satisfactorily	60-73
unsatisfactorily	0-59

10. Methodological support

1. Electronic training course "Modeling of business processes": https://elearn.nubip.edu.ua/course/view.php?id=5109

2. Lesia Voliak Methodical instructions for studying the discipline "Business Process Modeling" from the specialty 071 "Accounting and Taxation" educational program "Analytical and accounting and legal support of business" of the first (bachelor) level of full-time higher education. Kyiv. 2023.

11. Recommended sources of information

1. Бандоріна Л.М., Лозовська Л.І., Савчук Л.М. Моделювання економіки: навч. посібник. Дніпро: УДУНТ, 2022. 154 с. URL: http://eadnurt.diit.edu.ua/bitstream/123456789/15722/1/Bandorina.pdf
2. Благун І.С., Кічор В.П., Селюченко Н.Є. Економічне прогнозування: теоретичні та прикладні аспекти: підручник / за ред. В.П.Кічора. Львів: Растр-7, 2020. 290 с.
3. Бобровська О.Ю. Еволюція прогнозування розвитку соціально-економічних процесів: стан та напрямки удосконалення. URL: http://www.dridu.dp.ua/zbirnik/2011- 02(6)/11boysnu.pdf.
4. Веретенникова Г.Б., Омелаєнко Н.М. Методи діагностики та прогнозування розвитку підприємства: навч. посіб. Харків: ХНЕУ ім. С. Кузнеця, 2017. 190 с. URL: http://www.repository.hneu.edu.ua/bitstream.pdf.
5. Вітлінський В.В. Економіко-математичне моделювання: навч. посіб. 2018. 536 с.
6. Вітлінський В.В., Терещенко Т.О., Савіна С.С. Економіко-математичні методи та моделі: оптимізація: навчальний посібник. КНЕУ, 2016.
7. Галущак М. П., Галущак О. Я., Кужда Т. І. Прогнозування соціально-економічних процесів: навчальний посібник для економічних спеціальностей. Тернопіль: ФОП Паляниця, 2021. 160 с. URL: http://elartu.tntu.edu.ua/bitstream/lib.pdf
8. Григорків В.С. Моделювання економіки: підруч. Чернівці: Чернівецький нац. ун-т ім. Ю. Федьковича, 2019. 360 с.
9. Григорків В.С. Оптимізаційні методи та моделі : підручник / В.С. Григорків, М.В. Григорків, О.І. Ярошенко. Чернівці : Чернівецький нац. ун-т, 2022. 440 с.
10. Дослідження операцій ч.2 / Галаєва Л.В., Рогоза Н.А., Шульга Н.Г, К. : ЦП "КОМПРИНТ", 2018. 172 с.
11. Економіко-статистичне моделювання: навчальний посібник / В. П. Кічор, Р. В. Фещур, А. І. Якимів, С. Б. Копитко. Львів: Растр-7, 2017. 350 с.
12. Закон України «Про офіційну статистику» № 2524-IX від від 16.08.2022 р. URL: https://zakon.rada.gov.ua/laws/show/2524-20#Text (дата звернення 08.06.2023 р.)
13. Квасній М.М. Генезис методологічних засад економіко-математичного моделювання трансформаційних процесів у фінансовому секторі країни / М.М. Квасній // Трансформаційні процеси у фінансовому секторі національної економіки: теорія, методологія та моделювання: монографія / авт. кол. ; за заг. ред. д-ра екон. наук, проф. О. І. Барановського. – Київ : ДВНЗ “Університет банківської справи”, 2017. С. 313-355.
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Information resources

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3. Кабінет Міністрів України http://www.kmu.gov.ua/control/
4. Газета «Все про бухгалтерський облік» http://www.vobu.com.ua
5. Газета «Урядовий кур'єр» http://www.ukurier.gov.ua/
6. Журнал «Вісник податкової служби України» http://www.visnuk.com.ua
7. Міністерство фінансів України http://www.minfin.gov.ua
8. Нормативні акти України - законодавство для практиків http://www.nau.kiev.ua
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