Syllabus
educational component
(by the selection of applicants for education)

Third level of higher education (educational and scientific)

Management modeling in socio-economic systems

Discipline name:	Management modeling in socio-economic systems
Level of higher education:	third (Phd's degree)
Course page in Moodle:	https://dl2022.khadi.kharkov.ua/course/view.php?id=2415
Scope of the educational component:	4 credits (120 hours)
Final control form:	Credit
Consultations:	according to the schedule
Department name:	Department of Management
Language of teaching:	English
Head of the course:	Bocharova Nadiia Avakivna Candidate of Economic Sciences, associate professor
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Brief content of the educational component: The goal is the formation of a system of theoretical knowledge and practical skills in the application of methods and models in economic processes, the formation of the acquirers of competencies necessary for mastering the methods of substantiating the mechanism of change management in socio-economic systems; development and implementation of programs of innovative development of socio-economic systems of various types and scales. The subject of study of the academic discipline is the main provisions and methods of research of the most important aspects of the development of the economic system, qualitative and quantitative changes of productive forces, industrial relations, economic mechanism, methods of design of research results and their use in practical activities. The tasks of the discipline are the study of methodologies, technologies and instrumental

means of modeling economic processes, the acquisition of practical skills in the application of modern economic and mathematical methods in socio-economic objects, the mastery of practical skills in the application of economic and mathematical methods and models in economic processes, adaptation and use of modern software economic information processing tools for modeling economic processes, development and use of algorithms for modeling complex economic systems.

Types of economic and mathematical models and their use in economics. Peculiarities of the formation of economic and mathematical models in the economy in the conditions of transformational processes. Modeling the impact of state policy on the country's economy. Statistical model of linear multi-branch economy. Consumer behavior models. Models for determining the viability of enterprises. The use of recursive models in entrepreneurship. Models for determining ratings of economic entities as an important criterion of investment attractiveness.

Prerequisites for studying the educational component: all disciplines of general education and professional master's training.

Competences acquired by the student:

General competences:
1. Formation of a systematic scientific/artistic outlook, professional ethics and general cultural outlook;
2. Ability to think critically, generate new complex ideas, analyze and synthesize holistic knowledge;
3. Ability to organize and conduct original scientific research;
4. The ability to communicate with the scientific community for the purpose of presenting the results of scientific research and their publication in the state, English and/or another foreign language;
5. Ability to scientific and pedagogical activities in the field of management and administration;
6. Ability to act on the basis of ethical considerations and academic integrity.

Special (professional) competences:
1. The ability to search, process and analyze and summarize information for conducting independent scientific research in the field of management.
2. Acquisition of in-depth knowledge of management, in particular understanding of theoretical and practical problems, history of development and current state of scientific knowledge, critical analysis of basic concepts, origin, development and structure of the organization, ability to apply them to form a worldview, mastering scientific terminology.

3. Acquisition of universal skills of a researcher in the field of management, in particular, the use of modern information technologies in scientific activities, management of scientific projects and/or drafting of proposals for funding scientific research, registration of intellectual property rights.

4. Ability to implement the results of one's own research in the field of management.

5. Ability to plan and carry out scientific and applied research, present their results;

6. Ability to independently acquire new knowledge, use modern educational and research technologies in the field of management.

7. The ability to formulate modeling tasks, apply statistical methods and models for the analysis of objects and processes in the field of management.

8. Ability to comprehensively and systematically manage the activities of road transport enterprises in conditions of competition.

9. Understanding of the theoretical and methodological principles underlying the study of problems in the field of management of transport enterprises, development and improvement of the transport system of Ukraine, international transport corridors, transport and logistics systems.

Program Learning Outcomes:

1. To form a systematic scientific outlook, to possess modern theories and concepts in the field of management.

2. To organize and conduct original scientific research in the field of management at the appropriate professional level, to achieve scientific results that create new knowledge for solving current problems of theory and practice.

3. Demonstrate the skills of independent scientific research, flexible thinking, openness to new knowledge, evaluate the results of autonomous work and take responsibility for personal professional development and training of others.

4. Initiate, develop and implement projects in the field of management, manage them and search for partners for their implementation.

5. Carry out a critical analysis, summarize the results of scientific research, formulate and substantiate conclusions and proposals regarding the development of conceptual and methodological knowledge in the field of management.

6. To demonstrate the skills of presentation and publication of the results of scientific research in national and foreign languages in oral and written form.

7. To test and implement the results of one's own research in the field of management.

8. To act on the basis of ethical considerations and academic integrity in the process of conducting scientific research, publicizing the results and their implementation.

9. Identify and classify new tasks in the field of management by types of economic activity (motor transport and logistics), describe, analyze and evaluate relevant objects, phenomena and processes, choose optimal methods of their research.

10. Conduct research on problems in the field of transport economics, development and improvement of the transport system of Ukraine, international transport corridors, transport and logistics systems.

Thematic plan

№ topic	Name of topics (L, LW, PW, IT, IW)	Number of hours
		full-time
1	L. Types of economic and mathematical models and their use in economics	2
	IW. Packages of application programs for modeling management processes in the economy	12
2	L. Peculiarities of the formation of economic and mathematical models in the economy in the conditions of transformational processes	2
	PW. Decision environments and decision-making under conditions of certainty and uncertainty	2
	IW. Methodological aspects and tools for modeling processes of active adaptation in the economy	12
3	L. Modeling the impact of state policy on the country's economy	2
	IW. Models of economic security of the country	12
4	L. Statistical model of linear multi-branch economy	2
	PW. Analysis of market forces	2
	IW. Stationary trajectories	12
5	L. Models of consumer behavior	2
	IW. Conditions of Engel and Cournot aggregation	12
6	L. Models for determining the viability of enterprises	2
	PW. Cost management	2
	IW. Modeling of the viability structure of socio-economic systems	12
7	L. Use of recursive models in entrepreneurship	2
	IW. Use of recursive procedures when solving transport problems about destination	12

8	L. Models for determining the ratings of economic entities as an important criterion of investment attractiveness	2
	PW. Management of innovations in the market	2
	IW. Rating evaluation of the activity of motor transport enterprises	12
Total	L	16
	PW (LW, IT)	8
	IW	96

Individual educational and research task: not provided.

Methods of learning:
1) verbal:
1.1 traditional: lectures, explanations, stories;
1.2 interactive (non-traditional): problem lectures, discussions, etc.;
2) visual: the method of illustrations, the method of demonstrations;
3) practical:
3.1 traditional: practical classes, seminars;
3.2 interactive (non-traditional): business games, trainings, seminars-discussions, "round table", analysis of real problems, brainstorming method.

Evaluation system and requirements:

Current academic performance
1 The current success of applicants for the performance of educational types of work in training sessions and for the performance of independent work tasks is evaluated using a four-point rating scale with subsequent transfer to a 100-point scale. During the evaluation of the current academic performance, all types of work stipulated in the training program are taken into account.
1.1 Lecture classes are evaluated by determining the quality of performance of specified tasks.
1.2 Practical classes are evaluated by the quality of performance of a control or individual task, performance and design of practical work.
1.3 Seminar classes are evaluated by the quality of the performance of an individual task/abstract.
2 Evaluation of the current performance of higher education applicants is carried out at each practical session on a four-point scale ("5", "4", "3", "2") and entered in the log of academic performance:
– «excellent»: the applicant flawlessly mastered the theoretical material, demonstrates in-depth knowledge of the relevant topic or academic discipline, the main provisions;

– «good»: the applicant has mastered the theoretical material well, possesses the main aspects from primary sources and recommended literature, presents it in a reasoned manner; has practical skills, expresses his thoughts on certain problems, but certain inaccuracies and errors are assumed in the logic of the presentation of theoretical content or in the analysis of practical material;

– «satisfactory»: the applicant has mainly acquired theoretical knowledge of the educational topic or discipline, orients himself in primary sources and recommended literature, but answers unconvincingly, confuses concepts, answers additional questions uncertainly, does not have stable knowledge; when answering questions of a practical nature, reveals inaccuracy in knowledge, does not know how to evaluate facts and phenomena, connect them with the future profession;

– «unsatisfactory»: the applicant has not mastered the educational material of the topic (discipline), does not know scientific facts, definitions, hardly orients himself in primary sources and recommended literature, lacks scientific thinking, practical skills are not formed.

3 The final score for the current activity is recognized as the arithmetic mean sum of points for each lesson, for individual work, current control works according to the formula:

$$К^{current} = \frac{К1 + К2 + \ldots + Кn}{n},$$

where $К^{current}$– final evaluation of success based on the results of current control;

$К1, К2, \ldots, Кn$ – evaluation of the success of the current control measure;

n – number of measures of current control.

Grades are converted into points according to the calculation scale (table 1).

Table 1 – Recalculation of the average grade for the current activity into a multipoint scale

4- point scale	100- point scale	4- point scale	100- point scale	4- point scale	100- point scale	4- point scale	100- point scale
5	100	4,45	89	3,90	78	3,35	67
4,95	99	4,4	88	3,85	77	3,3	66
4,9	98	4,35	87	3,80	76	3,25	65
4,85	97	4,3	86	3,75	75	3,2	64
4,8	96	4,25	85	3,7	74	3,15	63

4,75	95	4,20	84	3,65	73	3,1	62
4,7	94	4,15	83	3,60	72	3,05	61
4,65	93	4,10	82	3,55	71	3	60
4,6	92	4,05	81	3,5	70	from 1.78 to 2,99	from 35 to 59
						re-compilation	
4,55	91	4,00	80	3,45	69	from 0 to 1,77	from 0 to 34
4,5	90	3,95	79	3,4	68	repeated study	

Final evaluation

1 An applicant of higher education receives a credit in the last lesson in the discipline based on the results of the current evaluation. The average score for the current activity is converted into points on a 100-point scale, according to the conversion table (table 1).

Applicants of higher education who have an average current score in the discipline lower than "3" (60 points) can increase their current score in the last session by taking tests in the discipline.

Evaluation of knowledge of applicants by means of testing is carried out according to a scale:

– «Excellent»: not less than 90% of correct answers;
– «Very good»: from 82% to 89% of correct answers;
– «Good»: from 74% to 81% of correct answers;
– «Satisfactory»: from 67% to 73% of correct answers;
– «Satisfactory enough»: from 60% to 66% of correct answers;
– «Unsatisfactory»: less than 60% of correct answers.

2 The conditions for receiving a credit are:

– making up all missed lessons;
– average current grade in the discipline not lower than "3" (60 points).

3 For performing individual independent work and participating in scientific events,
applicants are awarded additional points.

3.1 Additional points are added to the sum of points scored by the student of higher
education for the current educational activity.

3.2 The number of additional points awarded for different types of individual tasks depends on their volume and importance:

– prize places in the discipline at the international / all-Ukrainian competition of
scientific student works – 20 points;
– prize places in the discipline at the all-Ukrainian olympiads – 20 points;
– participation in the international / all-Ukrainian competition of scientific student
works – 15 points;

– participation in international / all-Ukrainian scientific conferences of students and
young scientists – 12 points;
– participation in all-Ukrainian olympiads in the discipline – 10 points;
– participation in olympiads and scientific conferences of the KhNAHU in the
discipline – 5 points;
– performance of individual scientific and research (educational and research) tasks
of increased complexity – 5 points.
3.3 The amount of additional points may not exceed 20 points.
4 The learning result is evaluated:
– on a two-point scale (passed/failed) according to Table 2;
– on a 100-point scale according to Table 3.

Table 2 – The scale for transferring points to the national evaluation system

100-point scale	National scale
from 60 points to 100 points	credited
less than 60 points	not credited

The final score, together with additional points, cannot exceed 100 points.

Table 3– The scale for evaluating the knowledge of students based on the results
of the final control of the academic discipline

Score in points	Evaluation on a national scale credit	Evaluation according to the ECTS scale	
		Evaluation	Criteria
90-100	Credited	**A**	The theoretical content of the course is fully mastered, without gaps, the necessary practical skills for working with the mastered material are formed, all educational tasks stipulated in the training program have been completed, the quality of their performance was evaluated with a number of points close to the maximum

Score in points	Evaluation on a national scale	Evaluation according to the ECTS scale	
	credit	Evaluation	Criteria
80–89		**B**	The theoretical content of the course is fully mastered, without gaps, the necessary practical skills for working with the mastered material are mainly formed, all educational tasks stipulated in the training program have been completed, the quality of performance of most of them was evaluated with a number of points close to the maximum
75-79		**C**	The theoretical content of the course is fully mastered, without gaps, some practical skills of working with the mastered material are insufficiently formed, all educational tasks stipulated in the training program have been completed, the quality of performance of none of them has been evaluated with the minimum number of points, some types of tasks have been completed with errors
67-74		**D**	The theoretical content of the course is partially mastered, but the gaps are not of a significant nature, the necessary practical skills for working with the mastered material are basically formed, most of the educational tasks stipulated in the training program have been completed, some of the completed tasks may contain errors
60–66		**E**	The theoretical content of the course is partially mastered, some practical work skills have not been formed, many educational tasks stipulated in the training program have not been completed, or the quality of some of them has been evaluated with a number of points close to the minimum

Score in points	Evaluation on a national scale	Evaluation according to the ECTS scale	
	credit	Evaluation	Criteria
35–59	Not credited	**FX**	The theoretical content of the course is partially mastered, the necessary practical work skills have not been formed, most of the educational tasks stipulated in the training program have not been completed, or the quality of their performance has been evaluated with a number of points close to the minimum; with additional independent work on the course material, it is possible to improve the quality of the performance of educational tasks (with the possibility of re-compilation)
0–34		**F**	The theoretical content of the course has not been mastered, the necessary practical work skills have not been formed, all completed educational tasks contain gross errors, additional independent work on the course material will not lead to any significant improvement in the quality of the performance of educational tasks (with a mandatory repeat course)

Course policy:

– the course involves working in a team where the environment is friendly, creative, open to constructive criticism;

– mastering the discipline involves mandatory attendance at lectures and practical classes, as well as independent work;

– independent work involves the study of certain topics of the discipline that are made in accordance with the program for independent processing, or were considered briefly, providing answers to theoretical questions and test tasks;

– all the tasks stipulated in the training program must be completed in due time;

– if the student is absent from the classes for good reason, he or she presents the tasks completed during the independent preparation and consultation of the teacher;

– while studying the course, students must adhere to the rules of academic integrity set forth in the following documents: "Rules of academic integrity of participants in the educational process of the KhNAHU" (https://www.khadi.kharkov.ua/fileadmin/P_Standart/pologeniya/stvnz_67_01_dobroch_1.pdf), "Academic integrity. Checking the text of academic, scientific and qualification papers for plagiarism" (https://www.khadi.kharkov.ua/fileadmin/P_Standart/pologeniya/stvnz_85_1_01.pdf), "The moral and ethical code of participants of the educational process of the KhNAHU" (https://www.khadi.kharkov.ua/fileadmin/P_Standart/pologeniya/stvnz_67_01_MEK_1.pdf).

– in the case of detection of plagiarism, the applicant receives 0 points for the task and must re-perform the tasks provided for in the syllabus; – write-offs during control work are prohibited (including using mobile devices). Mobile devices are allowed to be used only during online testing.

Recommended literature:

1. BanIrina-Marilena. Introducing house prices to the intertemporal current account model: An application to the European Union. *Economic Modelling*. 2022. V. 117. Retrieved from: https://www.sciencedirect.com/science/article/abs/pii/S026499932200298X

2. Champ B., Freeman S., Haslag J.H. Modeling Monetary Economies (5th ed.). Cambridge: Cambridge University Press. 2022. 250 p.

3. Gonul Colak, Mengchuan Fu, Iftekhar Hasan. On modeling IPO failure risk. *Economic Modelling*. 2022. V. 109. Retrieved from: https://www.sciencedirect.com/science/article/abs/pii/S0264999322000360

4. Janos Varga, Werner Roeger, Janin 't Veld. E-QUEST: A multisector dynamic general equilibrium model with energy and a model-based assessment to reach the EU climate targets. *Economic Modelling*. 2022. V. 114. Retrieved from: https://www.sciencedirect.com/science/article/pii/S0264999322001572

5. Neal Hughes, Wei Ying SohKenton, Lawson Michael Lu. Improving the performance of micro-simulation models with machine learning: The case of Australian farms. *Economic Modelling*. 2022. V. 115. Retrieved from: https://www.sciencedirect.com/science/article/pii/S0264999322002036

6. Stefano Bertelli, Gianmarco Vacca, Maria Zoia. Bootstrap cointegration tests in ARDL models. *Economic Modelling*. 2022. V. 116. Retrieved from: https://www.sciencedirect.com/science/article/abs/pii/S026499932200231

7. Zhiyong Li, Xiao Rao. Evaluating asset pricing models: A revised factor model for China. *Economic Modelling*. 2022. V. 116. Retrieved from: https://www.sciencedirect.com/science/article/abs/pii/S0264999322002425

8. Zhicheng Li, Xinyun Chen, Haipeng Xing . A multifactor regime-switching model for inter-trade durations in the high-frequency limit order market. *Economic Modelling*. 2022. V. 115. Retrieved from: https://www.sciencedirect.com/science/article/abs/pii/S0264999322003194

9. Shemayev V. Cognitive approach to modeling reflexive control in socio-economic systems*. Information and Security*, 2007. № 22. P. 28-37. URL : http://it4sec.org/system/files/22.04_Shemayev.pdf

10. Wei Shouke, et al. System dynamics simulation model for assessing socio-economic impacts of different levels of environmental flow allocation in the Weihe River Basin, China. *European Journal of Operational Research*, 2012. 221.1. P. 248-262. URL: https://www.sciencedirect.com/science/article/abs/pii/ S037722171200207X

Additional sources:

1. Distance course: https://dl2022.khadi.kharkov.ua/course/view.php?id=2415.

2. National Library of Ukraine named after Vernadskyi. URL: http://www.nbuv.gov.ua

3. Osvita.ua. Management. URL: https://osvita.ua/vnz/reports/management/

4. Center for financial and economic scientific research. Library. URL: http://www.economics.in.ua/p/blog-page_45.html

5. Educational materials online. URL: https://pidru4niki.com/menedzhment/; https://pidru4niki.com/marketing/; https://textbook.com.ua/marketing; http://eclib.net/21/index.html; http://www.management.com.ua/marketing/mark165.html

6. TRADING ECONOMICS. URL: https://tradingeconomics.com

7. Official website of the State Statistics Service of Ukraine [Electronic resource]. URL: http://ukrstat.gov.ua

8. Official website of the Department of Statistics of the United Nations [Electronic resource]. URL: http://unstats.un.org/unsd/default.htm

9. Official website of the Ministry of Economic Development and Trade of Ukraine.URL: http://me.kmu.gov.ua
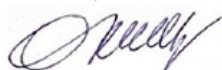
10. Official website of the World Economic Forum. URL: http://www.weforum.org

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