MATHEMATICAL MODELLING IN MANAGEMENT

COURSE SYLLABUS

Code and name of specialty	**073 – Management**	**Institute**	**Institute of Education and Science in Economics, Management and International Business**
Program name	**Business Administration**	**Department**	**Management and taxation**
Type of program	**Educational and Professional**	**Language of instruction**	**English**

LECTURER

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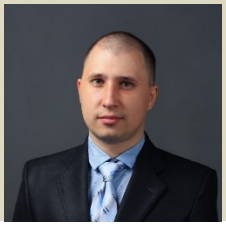

Ph.D. (C.Sc.) in Economic Science, Senior lecturer of the Management and taxation department (NTU "KhPI"). Authored and co-authored over 10 scientific publications.
Courses: Economic and mathematical methods in taxation, Econometrics, Logistics

GENERAL DESCRIPTION OF THE COURSE

Summary	The course is aimed at obtaining by students in-depth knowledge of the methods of constructing mathematical models, applied economic problems and ways of their solution. Students will master the applied modeling and decision-making tools in management problems. The course is based on lectures and practical activities. Lectures will consist of theory exploration, examples and class discussion. Homework assignments will focus on putting the lecture material into practice.
Course objectives	● to form a general idea of the search, collection and analysis of information, the calculation of indicators to substantiate management decisions; ● disclose management methods to ensure the effectiveness of the organization's activities; ● develop students' ability to choose and use modern management tools.
Types of classes and control	Lectures, practical classes, consultations. Individual assignment (no exam).
Term	6

Student workload (credits) / Type of course	5 / ELECTIVE	**Lectures (hours)**	24	**Workshops (hours)**	24	**Self-study (hours)**	102

Program competences	GC04. The ability to apply knowledge in practical situations GC10. The ability to conduct research at an appropriate level. SC09. The ability to generate business ideas, to justify the feasibility and forms of their implementation as well as present them to stakeholders

Learning outcomes	**Teaching and learning methods**	**Forms of assessment**

		(continuous assessment CAS, final assessment FAS)
LO 04. To show skills of identification of problems and justification of management decisions.	Interactive lectures with presentations, practical classes, problem solving, research methods, work with databases using Excel spreadsheet	Written individuak assignment (FAS), practical assessment (CAS)
LO 06. To show skills of search, collecting, and analysis of information, calculation of indicators to substantiate management decisions.	Interactive lectures with presentations, practical classes, problem solving, research methods, work with databases using Excel spreadsheet	Written individuak assignment (FAS), practical assessment (CAS)
LO 08. To apply management methods to ensure the effectiveness of the organization.	Interactive lectures with presentations, practical classes, problem solving, research methods, work with databases using Excel spreadsheet, teamwork	Written individuak assignment (FAS), practical assessment (CAS)
LO2.3. To make calculations and to evaluate the effectiveness of real and financial investments	Interactive lectures with presentations, practical classes, problem solving, research methods, work with databases using Excel spreadsheet	Written individuak assignment (FAS), practical assessment (CAS)
LO2.4. To adapt existing methods and approaches to various business tasks, to perform the functions of a business integrator, to plan and to manage time resources.	Interactive lectures with presentations, practical classes, problem solving, research methods, work with databases using Excel spreadsheet	Written individuak assignment (FAS), practical assessment (CAS)

ASSESSMENT AND GRADING

	Total score (points) for all types of learning activities	ECTS grading scale	The national grading scale		
Ranges of points corresponding to grades	90-100	A	excellent	**Allocation of grade points**	**100% Final assessment as a result of Individual assignment (40%) and Continuous assessment (60%).** **40% Individual assignment:** written assignment (theory + problem solving) and its oral presentation. **60% Continuous assessment:** practical tasks.
	82-89	B	good		
	74-81	C			
	64-73	D	satisfactory		
	60-63	E			
	35-59	FX	Unsatisfactory (with the exam retake option)		
	0-34	F	Unsatisfactory (with mandatory repetition of the course)		

Course policy	Students are expected to attend classes regularly, to get to class on time and stay for the duration of the class. In the case of absence, students will be required to submit all assignments to make up for the missed classes. Students are also expected to come to class having read all the required material and being ready to productively participate in the class discussions. Written assignments should be submitted before the specified deadlines.

COURSE STRUCTURE AND CONTENT

Lecture 1	Models and modeling in management	**Workshop 1**	Building a mathematical model Model building using Microsoft Excel	**Self-s**	Reading suggested literature, making calculations. Stages of modeling
Lecture 2-3	Linear optimization mathematical models in management	**Workshop 2-3**	Methods for solving linear programming problems. Linear programming problems solution using		Reading suggested literature, making calculations

			Microsoft Excel	t u d y	
Lecture 4	Special linear programming problems	**Workshop 4**	Computer modeling using Microsoft Excel		Reading suggested literature, making calculations. Transportation problems
Lecture 5-6	Mathematical programming problems	**Workshop 5-6**	Solving nonlinear programming problems using Microsoft Excel		Reading suggested literature, making calculations. Graphical interpretation of nonlinear programming problems solution
Lecture 7	Balance-based economic and mathematical models. Financial mathematics elements	**Workshop 7**	Linear international trade model in Microsoft Excel. Compound interest and balance sheet equation of loan repayment		Reading suggested literature, making calculations. Economic and mathematical model of intersectoral balance
Lecture 8-9	Econometric models. Paired regression analysis, non-linear regression	**Workshop 8-8**	Computer modeling using Microsoft Excel.		Reading suggested literature, making calculations
Lecture 10-11	Decision making models in management	**Workshop 10-11**	Decision-making models under conditions of risk and uncertainty using Microsoft Excel.		Reading suggested literature, making calculations
Lecture 12	Decision-making methods under conditions of risk and under conditions of complete uncertainty	**Workshop 12**	Building models using Microsoft Excel		Reading suggested literature, making calculations

RECOMMENDED READING

Compulsory

1. Kemaeva, M. V. (2017). Economic mathematical models. Nizhni Novgorod: Nizhegorodskij gosuniversitet
2. Carter, M. (2001). Foundations of Mathematical Economics. London: The MIT Press.
3. Mazen, Sh. (2021). Explorations of Mathematical Models in the Management, Life, and Social Sciences with Microsoft Office Excel. John Wiley & Sons.
4. Walter, J. M. (2004). Concepts of Mathematical Modeling. Courier Corporation.
5. Stefan, H. (2011). Mathematical Modeling. Springer Science & Business Media.

Recommended

1. Білоцерківський, О. Б. (2018). Математичне моделювання в економіці та менеджменті. Харків: НТУ “ХПІ”.
2. Замула, О. В., & Замула, О. О. (2019). Основи роботи в Excel. Харків: НТУ “ХПІ”.
3. Замула, О. В., & Замула, О. О. (2019). Робота з надбудовою Solver MS Excel. Харків: НТУ “ХПІ”.
4. Копич, І. М., Сороківський, В. М., & Стефаняк, В. І. (2011). Математичні моделі в менеджменті та маркетингу. Львів: Новий світ.
5. Stachurski, J. (2009) Economic Dynamics Theory and Computation. London:The MIT Press.
6. Bokil, V. A. (2009) Mathematical Modeling. London: The MIT Press.

Academic integrity

Graduate students are expected to adhere to the Code of Ethics of Academic Relations and Integrity” of NTU “KhPI”.

The content of this syllabus is consistent with the course program.