

MODELLING OF ECONOMIC PROCESSES

1. Discipline/module data

Faculty	Economic Engineering and Business				
Department	Economics and Management				
Academic degree	Cycle I Studies, License				
Study-programme	0413.1 Business and Administration				
Year of study	Semester	Type of evaluation	Formative category	Category of optionality	Credits ECTS
II (full-time)	4	E	D – domain-specific subject, included in the category of specialty disciplines	O – mandatory course	4
III (part-time)	5	E			

2. Total estimated time

Total hours in the curriculum	Including:				
	Contact hours		Individual work		
	Course	Practical lessons	Year project	Study of theoretical material	Preparing applications
Full-time					
120	30	30	-	30	30
Part-time					
120	12	12	-	48	48

3. Prerequisites to access the discipline/module

According to the curriculum	Economic Mathematics, Statistics, Enterprise economy, Microeconomics, Macroeconomics
According to competences	Obtaining the practical skills to apply the mathematical models in economics, to elaborate mathematical models in economics based on the presented data, to solve the models individually or by using the QM application for Windows and to interpret the obtained results in order to adopt optimal decisions in enterprise management.

4. Conditions for carrying out the educational process

Course	The teaching process will prioritize active-participatory methods such as intensified lectures and anticipatory reading. Activities will be structured into two-hour units, combining individual and group work for a dynamic, logical, and coherent approach. The use of a projector and computer is required for theoretical material presentations, and student tardiness and phone calls during class will not be tolerated.
Practical lessons	During the practical lessons, the mathematical models in economics will be elaborated and solved for various practical situations, and it will be analyzed for the aimed optimal solution and the acquired knowledge will be applied in theoretical courses and in practice.

5. Specific competences acquired

Professional competences	PC1. The use of economic-mathematical methods and models for solving specific tasks in the analysis and decision-making in the economy. ✓ Appropriate use of fundamental economic concepts, methods, software applications and digital technologies. ✓ Appropriate use of fundamental knowledge for explaining economic processes and phenomena with the use of software applications and digital technologies for solving specific tasks in the analysis and decision-making. ✓ Application of fundamental methods, software programs and digital technologies for solving tasks specific to the economy. ✓ Appropriate use of criteria and standard methods for evaluating efficiency with the use of software applications and digital technologies for solving tasks specific to the economy. ✓ Development of professional projects with the use of software applications and digital technologies in solving economic problems. PC2. Synthesis and problems formulation based on economic analysis and carried out at the enterprise level. ✓ Synthesis of methods, techniques, procedures specific to the economic fields: marketing, production, human resources, finance and problems formulation. ✓ Use of fundamental knowledge in the synthesis and problems formulation at the enterprise level. ✓ Application of synthesis principles in concrete situations for the economic fields of marketing, production, human resources and finance. ✓ Appropriate use of criteria and standard methods for evaluation and adoption in concrete specific situations to the economic fields of marketing, production, human resources and finance. PC3. Development of the problems alternative solution at the enterprise level. ✓ Evaluation of technical procedures and methods specific to the fields of activity of enterprises and selection of optimal decisions. ✓ Use of fundamental knowledge to develop the problems alternative solution at the enterprise level. ✓ Application of fundamental principles and methods in the evaluation of alternative solutions for solving problems at the enterprise level. ✓ Appropriate use of criteria and standard methods for evaluation and adoption the basic techniques and methods necessary in the processes of solving problems at the enterprise level. ✓ Development of professional projects specific to the economic field by selecting and using concrete principles and specific methods for solving problems at the enterprise level.
Transversal competences	TC1. Applying professional ethics and responsibly fulfilling professional tasks in conditions of limited autonomy and qualified assistance TC3. Objectively self-assessing the need for continuous professional training for labor market integration and adapting to its dynamics, as well as for personal and professional development

6. Subject/module objectives

General objective	It is to train the future specialists in a new type of the economic thinking that is based on the practical application of the mathematical modeling methodology in economical processes.
Specific objectives	✓ Learning the possibilities of applying economic-mathematical methods and models in order to optimize managerial decisions; ✓ Developing economic-mathematical models; ✓ Learning the methods of solving economic-mathematical models; ✓ Obtaining of the skills in solving economic-mathematical models with by using applications software; ✓ Formulating the conclusions based on the obtained optimal solutions as a result of solving the models.

7. Content of the subject/module

Topics of teaching activities	Number of hours	
	full-time study	part-time study
Lecture topics		
T1. Objective and tasks of the discipline. Fundamentals of economic-mathematical modeling.	2	1,5
T2. Production functions and calculation of the parameters.	2	
T3. Estimation of the production function parameters.	2	1,5
T4. Multiple production functions.	2	
T5. Dynamic models of production functions.	2	1,5
T6. Characteristics of production functions.	2	
T7. Notion of optimal planning. Model of the general problem of optimal planning.	2	2
T8. Optimal evaluations and their use in the economic analysis.	2	
T9. Optimization of the enterprise production program.	3	3
T10. Models of operational planning.	3	
T11. Economic-mathematical analysis of solutions to optimal planning problems.	2	
T12. Models of optimization of cargo transportation.	2	2,5
T13. Duality of transport problems and special cases in the transport problem.	2	
T14. The problem of optimizing the development and territorial location of enterprises.	2	
Total course	30	12
Topics of practical lessons		
LP1. Calculation of the production function parameters. Evaluation of the correlation dependence.	2	1,5
LP2. Estimation of the production function parameters.	2	
LP3. Calculation of the multiple production function parameters. Calculation of the multiple correlation coefficient and its estimation.	2	2
LP4. Dynamic models of the production function.	2	
LP5. Characteristics of the production function.	2	1,5
LP6. Formulation and solution of the optimal planning problems by using the simplex algorithm.	2	
LP7. Optimal evaluations and their use in economic analysis.	2	1,5
LP8. Optimization of the enterprise's production program.	2	

LP9. Models of distribution of production tasks by calendar periods of the year. Models of distribution of the production program by subdivisions.	2	2
LP10. Mathematical model of optimization of the raw material mix. Mathematical model of the material cutting optimization.	2	
LP11. Mathematical model of optimization and the use of equipment with mutual substitution.	2	
LP12. Economic-mathematical analysis of solutions to optimal planning problems.	2	3
LP13. Optimization of cargo transportation.	2	
LP14. Special cases in transportation problems. Multistage transportation problem.	2	
LP15. Optimization of the development and the territorial location of enterprises. Application of the nonlinear model to the optimization of the development and territorial location of enterprises.	2	0,5
Total practical lessons	30	12

8. References:

Mains (Mandatory)	1. Moodle UTM. Economic process modelling. http://moodle.utm.md/course/view.php?id=133 2. Anghelache C., Anghel M. Modelare economică. Concepte, teorie și studii de caz., Editura Economică. București, 2014. 3. Camelia Rațiu-Suciu, Modelarea și simularea proceselor economice, București, 2005. Abonament și sala de lectura. 4. Tanasoiul Ovidiu, Iacob Iluzia. Modele econometrice. www.biblioteca-digitala.ase.ro 5. Gumeniuc Ina, Modelarea proceselor economice. Îndrumar metodic privind îndeplinirea lucrărilor individuale, Editura Tehnica-UTM, Chișinău, 2021.
Additional (optional)	1. Andrei T., Spătaru L. Aplicații în econometrie. Editura Economică. București, 2010. 2. Vasile Nica, Virginia Maracine, Modelarea activității firmei, București, Edit: Matrix Rom, 2001. Format electronic. 3. Modelarea și simularea proceselor economice. Format PDF biblioteca FIEB. 4. Modelarea proceselor economice-aplicații. Format PDF biblioteca FIEB 5. Modelarea deciziei financiare. Format PDF biblioteca FIEB. 6. Modelarea deciziei financiare-aplicații. Format PDF biblioteca FIEB. 7. Modele econometrice. Format PDF biblioteca FIEB. 8. Modelarea în economia mediului. Format PDF biblioteca FIEB. 9. Gumeniuc Ina. The correlation analysis of the dependence of the gross internal product on basic factors. Journal of Social Sciences. 2018, Vol I(1). ISSN 2587-2490, eISSN 2587-3504. 10. Gumeniuc Ina. Utilizarea modelelor economico - matematice în studierea pieței. În: materialele Conferinței Tehnico-Științifice a Colaboratorilor, Doctoranzilor și Studenților, Vol. III, U.T.M., Chișinău, 20-21 octombrie 2014 (ISBN 978-9975-45-382-0), p. 373-376. 11. Gumeniuc Ina. Utilizarea modelelor economico-matematice în optimizarea activității de aprovizionare a fabricilor de lapte din Republica Moldova. În: Materialele Conferinței Tehnico-Științifice a Colaboratorilor, Doctoranzilor și Studenților, Vol. 3, U.T.M., Chișinău, 17-19 noiembrie 2010 (ISBN 978-9975-45-160-4), p. 255-258.

	12. Измерение факторов влияния на уровень оплаты труда женщин в Молдове. În tezele conferinței: “European Integration through the straightening of education, research, innovations in Eastern Partnership Countries” 16-17 mai 2022. https://eushare-project.eu/2022/03/02/announcement-about-international-conference/
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9. Evaluation

Education form	Periodic evaluations		Current evaluation	Individual study	Exam
	PE 1	PE 2			
full-time study	15%	15%	15%	15%	40%
part time study	25%			25%	50%
Minimum performance standard					
Attendance and involvement (activity) at lectures and practical lessons.					
Obtaining the minimum grade '5' for each type of evaluation.					