Description of Discipline

Title of Discipline / **Mathematical Modeling of Business Activity**				
Semester	**Duration**	**Type of Discipline**	**ECTS Credits**	**Student Workload**
8	150 hrs.	elective	5	40 hours of teaching, 110 hours of self-study

Requirements for Participation	**Type of examination (oral, written, term paper, etc.)**	**Methods of teaching and learning (lectures, seminars, etc.)**	**Discipline Coordinator**
Completed disciplines 'Business Economics', 'Organization of Production', 'Computer Science'	Written exam	Lectures, practical classes, self-study, individual assignments	M. Polenkova

Learning Outcomes
GC3. Ability to abstract thinking, analysis and synthesis.
GC4. Ability to apply knowledge in practical situations.
GC5. Ability to communicate in the state language both orally and in writing.
GC6. Ability to communicate in a foreign language.
GC7. Skills in the use of information and communication technologies.
GC8. Ability to search, process and analyze information from various sources.
GC9. Ability to adapt and act in a new situation.
GC11. Ability to make informed decisions.
SC1. Ability to show knowledge and understanding of the problems of the subject area, the basics of the modern economy at the micro, meso, macro and international levels.
SC7. Ability to use computer technology and data processing software to solve economic problems, analyze information and prepare analytical reports.
SC8. Ability to analyze and solve problems in the field of economic and social relations.
SC9. Ability to predict socio-economic processes on the basis of standard theoretical and econometric models.
SC10. Ability to use modern sources of economic, social, managerial, accounting information for the preparation of official documents and analytical reports.
SC11. Ability to substantiate economic decisions on the basis of understanding the laws of economic systems and processes and using modern methodological tools.
SC12. The ability to independently identify problems of an economic nature in the analysis of specific situations, to suggest ways to solve them.
SC14. Ability to analyze in depth problems and phenomena in one or more professional areas, taking into account economic risks and possible socio-economic consequences.
SC17. Have methods, techniques and tools for assessing the results of the functioning and development of economic systems at the micro, meso, macro levels.
SC27. Ability to prepare information, choose the type of model, calculate its parameters and assess adequacy.
PLO1. Know and use economic terminology, explain the basic concepts of micro- and macroeconomics.
PLO2. Understand the principles of economics, features of economic systems.
PLO10. Apply the acquired theoretical knowledge to solve practical problems and meaningfully interpret the results.
PLO11. Identify sources and understand the methodology for determining and methods of obtaining socio-economic data, collect and analyze the necessary information, calculate economic and social indicators.

PLO12. Be able to use data, provide arguments, critically evaluate logic and draw conclusions from scientific and analytical texts on economics.

PLO14. Use regulations and legal acts governing professional activities.

PLO15. Use information and communication technologies to solve socio-economic problems, prepare and present analytical reports.

PLO16. Be able to think abstractly, apply analysis and synthesis to identify key characteristics of economic systems at different levels, as well as the behavior of their subjects.

PLO21. Be able to develop optimal plans for the enterprise as a whole and its individual units.

PLO22. Establish economic links between the elements of the enterprise management system, have the technology of integrated management of material, information and financial flows of the enterprise.

PLO23. Assess possible risks, socio-economic consequences of management decisions.

Contents

MODULE 1. BUSINESS ACTIVITY PLANNING

Topic 1. Substantiation of choosing an investment project

Selection of investment projects under the conditions of limited financial resources.

Model of optimization of financing of investment projects taking into account bank interest. Comparative analysis of investment project performance indicators. Risk analysis of investment projects. Investment lending and quantitative risk assessment of a project. A dynamic model of investment planning taking into account risks.

Topic 2. Production planning and its stages

Scheduling. Work planning of the production association. Planning with dynamic programming methods

Topic 3. Methods and models of inventory management in marketing

MODULE 2. MODELING PRODUCTION ACTIVITIES

Topic 4. Company management models

The theory of a single-source firm. Dynamic tasks of a single-source firm. Multifactor production functions. Mathematical theory of production of a multisource firm. Economic characteristics of the production process. Production stages. Models of behavior of the firm.

Topic 5. Modeling the dynamics of development of fixed assets and finance of the enterprise

Model of small business dynamics. Modeling of enterprise finance management. Dynamics of the reserve fund of small business. A two-factor model of small business development. Modeling of remuneration optimization at the enterprise. Small enterprise in the structure of an industrial complex.

Exemplary Literature

Primary

1. Berezhnaya E.V. Mathematical methods of modeling economic systems: Textbook. Manual / E.V. Berezhnaya, V.I. Berezhnyi. - M .: FiS, 2001.

2. Economic and mathematical methods and models in marketing: Textbook for universities / Ed. V.V. Fedoseieva. - M .: UNITI-DANA, 2001.

3. Bakanov M.I. Economic analysis: situations, tests, examples, problems, selection of optimal solutions, financial forecasting: Textbook. / M.I. Bakanov, A.D. Sheremet. - Moscow: Finance and Statistics, 1999.

4. Taha, Hemdi A. Introduction to the study of operations / Taha, A. Hemdi, 7th ed . - M .: Williams Publishing House, 2005. - 912 p.

5. Economic and mathematical modeling: a textbook / Ed. O.T. Ivashchuk. - Ternopil: TNEU "Economic Thought", 2008. - 704 p.

Supplementary

1. Vitlinsky V.V. Modeling of economy. Tutorial. - K .: KNEU, 2003. - 408 p.

2. Kolodnitsky M.M. Fundamentals of the theory of mathematical modeling of systems. - Zhytomyr, 2001. - 718p.

3. Vitlinsky V.V., Nakonen S.I., Tereshchenko T.O. Mathematical programming: Textbook. - K .: KNEU, 2001. - 248 p.

4. Klebanova T.S. Mathematical methods and models of market economy: textbook. manual / T.S. Klebanova, M.O. Kizim, O.I. Chernyaktain. –X. : VD "INZHEK", 2009. – 456 p.

5. Chemerys A., Yurynets R., Myshchyshyn O. Optimization methods in economics. Tutorial. - K .: Center for Educational Literature, 2006. - 152p.

Web resources

1. http://stud.com.ua/9254/ekonomika/ekonomiko-matematichni_metodi_i _ prikladni _modeli - Applied economic and mathematical models

2. http://www.uabs.edu.ua/images/stories/docs/K_F/Yepifanov_16.pdf - Modern and promising methods and models of management in the economy. Monograph.

3. ekhnuir.univer.kharkov.ua/handle/123456789/9599 - Modeling of world economic processes: Textbook.

4. Theoretical foundations of quantitative methods of modeling and forecasting of economic processes // http://bookss.co.ua/book_medoti-ekonomyko-statestichnih-doslidzhen_806/3_1.-teoretichn-osnovi-klksnih-metodv-modelyuvannya-taprognozuvannya-ekonomchnih-procesv.

Academic staff

Name	Academic degree	Position	Qualification / Academic Discipline	Full-time / Part-time	Area of Teaching
Polenkova Maryna Volodymyrivna	PhD in Economics	Associate Professor at the Department of Theoretical and Applied Economics	Financial and Economic Re-Training Institute of Chernihiv Technological Institute (1996), specialty – Finance and Credit, qualification – Economist; PhD in Economics 08.00.05 Development of Productive Forces and Regional Economics	Full-time	Regional Economics, Marketing, Organization of Production, Economics and Organization of Innovative Activity, Logistics, Mathematical Modeling of Business Activity, Substantiation of Business Decisions and Risk Assessment, Economic Substantiation of Projects