ECONOMETRICS
(ADVANCED LEVEL)

Syllabus for Master’s program
1-25 81 06 «Accounting, analysis and audit»
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RECOMMENDED FOR APPROVAL BY:
Department of Economic Informatics of educational establishment «Belarus State Economic University»
(minutes № on «22 » 01 2019);
The scientific-methodical Council of the educational establishment «Belarus State Economic University»
(minutes № on «20 » 02 2019).
EXPLANATORY NOTE

Econometrics (Advanced Level) studies quantitative and qualitative relationships between objects, processes and phenomena of the economic sphere at micro- and macrolevels based on the methods of mathematical statistics.

The purpose of educational discipline «Econometrics (Advanced Level)» is studying methods for constructing and evaluating econometric models for their further practical application in the applied field.

Tasks of educational discipline «Econometrics (Advanced Level)»:
- to form an idea of the importance of econometric research at the enterprise level and for the economy as a whole;
- to master the theoretical prerequisites for econometric analysis and acquire practical skills in the construction and evaluation of econometric models;
- to familiarize with the basic approaches to forecasting on the basis of econometric models.

Master should have the following professional competencies, should be able to:
- PC-2. Search, analyze and evaluate the sources of information for conducting economic calculations.
- PC-3. Estimate the effectiveness of projects taking into account a random factor.
- PC-11. Prepare tasks and develop project solutions under a random factor.
- PC-13. Apply the latest software and technology tools to work with statistical information.
- PC-25. Apply methods of analysis and organization of innovation implementation.

As a result of studying «Econometrics (Advanced Level)» master student must
know:
- types of econometric models and methods of their construction;
- methodology of specification, identification and verification of econometric models;
- methods for estimating the model parameters;
- probabilistic and statistical methods for estimating the random component of the model;
- criteria for estimating regression parameters under violation of the basic assumptions of the Ordinary Least Squares;
- main problems of econometric modeling of economic objects, processes and phenomena;

be able to:
- justify the choice of econometric models of analysis and forecasting of economic processes and phenomena at macro, meso- and micro levels;
- build econometric models on the basis of time series, cross-sectional and space and space-time data;
estimate the parameters of the model as a whole, interpret their economic meaning;
identify and eliminate from the econometric models the distorting effects associated with the noisiness of empirical data, the multicollinearity of exogenous variables, the autocorrelation of the levels of indicators of dynamic series, the heteroscedasticity of random residuals;

have skills:
- of application of general purpose software;
- of performing calculations using special software.

The study of «Econometrics (Advanced Level)» assumes that students know the main concepts of mathematical statistics, elements of probability theory, the basic course of econometrics, economic theory, macroeconomic analysis and information technologies.

The knowledge control is carried out with practical tests and tests on personal computer.

In accordance with the curriculum of the specialty 1-25 81 06 «Accounting, analysis and audit» the course consist of 72 academic hours, including 36 classroom hours. Distribution by occupation is the following: lectures – 10 hours; practical classes – 16 hours; laboratory classes – 10 hours. Form of the current certification is a credit.
THE CONTENT OF EDUCATIONAL MATERIAL

Topic 1. Multiple linear regression


Topic 2. Nonlinear regression

Classification of nonlinear regression models. Simple and multiple nonlinear regression models which can be reduced to linear ones. Estimation of the parameters of nonlinear regression models. Applications of nonlinear regression models.

Topic 3. Econometric analysis under violation of the assumptions for building a classical regression model


Topic 4. Regression models with variable structure

Dummy variable. The application of the least squares method for estimating the parameters of a model with dummy variables. Applications of the regression model with dummy variables.

Topic 5. Systems of econometric equations

Topic 6. Stationary time series


Topic 7. Nonstationary time series

Nonstationary time series. Classification and general characteristics of nonstationary time series models. Models of time series with deterministic trend and methods of their construction. Definition and properties of the ARIMA model. Construction and testing of the ARIMA model based on the Box-Jenkins approach. Features of the construction of seasonal model ARIMA. Forecasting economic indicators based on the ARIMA model.

Topic 8. Method of singular spectral analysis of the processing of one-dimensional time series

<table>
<thead>
<tr>
<th>Topic's number</th>
<th>Topic</th>
<th>Lectures</th>
<th>Practical lessons</th>
<th>Seminars</th>
<th>Laboratory lessons</th>
<th>The number of control independent work hours</th>
<th>Other</th>
<th>Form of the knowledge control</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Multiple linear regression</td>
<td></td>
<td>2</td>
<td></td>
<td></td>
<td>[1-7, 9, 11-12]</td>
<td></td>
<td>Control practical task</td>
</tr>
<tr>
<td>2</td>
<td>Nonlinear regression</td>
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<td>[1-7, 9, 11-12]</td>
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<td>Control practical task</td>
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<tr>
<td>3</td>
<td>Econometric analysis under violation of the assumptions for building a classical regression model</td>
<td></td>
<td>2</td>
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<td></td>
<td>[1-7, 9, 11-12]</td>
<td></td>
<td>Control practical task</td>
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<tr>
<td>4</td>
<td>Regression models with variable structure</td>
<td></td>
<td>2</td>
<td></td>
<td></td>
<td>[1-7, 9, 11-12]</td>
<td></td>
<td>Test</td>
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<tr>
<td>5</td>
<td>Systems of econometric equations</td>
<td></td>
<td>2</td>
<td></td>
<td></td>
<td>[2-5, 11-12]</td>
<td></td>
<td>Test</td>
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<tr>
<td>6</td>
<td>Stationary time series</td>
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<td>2</td>
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<td>[2-4, 7-8, 10]</td>
<td></td>
<td>Control practical task</td>
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<tr>
<td>7</td>
<td>Nonstationary time series</td>
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<td>2</td>
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<td></td>
<td>[2-4, 7-8, 10, 13]</td>
<td></td>
<td>Test</td>
</tr>
<tr>
<td>8</td>
<td>Method of singular spectral analysis of the processing of one-dimensional time series</td>
<td></td>
<td>4</td>
<td></td>
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<td>[2-4, 7-8, 10]</td>
<td></td>
<td>Test</td>
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<tr>
<td><strong>Total hours</strong></td>
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<td><strong>10</strong></td>
<td><strong>16</strong></td>
<td><strong>10</strong></td>
<td></td>
<td><strong>Credit</strong></td>
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INFORMATIONAL AND METHODOLOGICAL PART

Methodical recommendations on the organization of master students independent work in academic discipline «Econometrics (Advanced Level)»

An important stage of the studying of the educational discipline is independent work of master students. Budget of the time for independent work is recommended as, on average, 1,5-2 per 2-hours classroom lesson.

The main directions of the master student independent work are:
- Initially a detailed acquaintance with the program of the educational discipline;
- acquaintance with the list of recommended references on the educational discipline in general and its sections, the study of necessary literature on the topics of the syllabus, the selection of necessary information in additional literature;
- preparation for practical and laboratory classes;
- preparation for the implementation of diagnostic monitoring forms (control practical tasks, tests);
- preparation for credit or exam.

References

Basic:


Additional:

## MINUTES OF SYLLABUS ENDORSEMENT

<table>
<thead>
<tr>
<th>Title of the academic discipline with the current discipline should be endorse</th>
<th>Department</th>
<th>Suggestions of changes in the syllabus content</th>
<th>Decision of the department (with the number and date of the minutes)</th>
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<tbody>
<tr>
<td>Audit and related services</td>
<td>Department of Accounting, analysis and audit in the sectors of the national economy</td>
<td>No suggestions</td>
<td>Minutes № __<strong>&lt;br&gt; «</strong> » __<strong>201</strong></td>
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<td>Financial management</td>
<td>Department of Accounting, analysis and audit in the sectors of the national economy</td>
<td>No suggestions</td>
<td>Minutes № __<strong>&lt;br&gt; «</strong> » __<strong>201</strong></td>
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SYLLABUS ADDITIONS AND CHANGES
in _____/____ academic year

<table>
<thead>
<tr>
<th>№</th>
<th>Additions and changes</th>
<th>Reasons</th>
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Syllabus is re-considered and approved on the meeting of the department of economic informatics (minutes № ___ on ______ 20___).

Head of the department
Ph.D. (Economics), Associate Professor ______________ A.M. Zenevich

APPROVE
Director of the Institute
of Masters Programs
Ph.D. (Economics), Associate Professor ______________ O.A. Morozевич