

Belarusian State Economic University

APPROVE

Belarusian State Economic University

Rector

V.Yu.Shutilin

“ 27 ” 12 2019

Registration № УД- 4203-19

BUSINESS STATISTICS USING EXCEL

The higher education curriculum (training program)
on an academic discipline
for the specialties 1-25 80 10 «Statistics and analysis»

2019

COMPILERS:

Agabekova N.V., head of the Statistics Department of the educational institution “Belarusian State Economic University”, Doctor of Economics;

REVIEWERS:

Bondarenko N.N., ass. prof. of the Finance and Real Estate Management Department of educational institution “Institute of Business (BSU)”, Candidate of Economics;

Zaretsky V.O., ass. prof. of the Department of Accounting, Analysis, Audit in Industry of the educational institution “Belarusian State Economic University”, Candidate of Economics

RECOMMENED FOR APPROVAL:

Statistics Department of the educational institution “Belarusian State Economic University”

(Protocol № 4 from 21 November , 2019)

Scientific and methodological Council of the educational institution “Belarusian State Economic University”

(Protocol № 3 from 20.12. 2019).

EXPLANATORY NOTE

Managerial decision-making at all levels - from the national or regional level, and to economic entities - is not possible without proper statistical software products, and in particular, the Excel computer program, which is a component of the office suite of Microsoft Office applications, installed everywhere, will allow you to quickly and efficiently conduct comprehensive data analysis to ensure decision-making in business.

Discipline "Business Statistics using Excel" is one of the special educational disciplines that form of training in the field of business administration.

The subject of discipline - to disclose the nature and content of the statistical survey, giving a quantitative description of the massive socio-economic phenomena and processes that you can make well-founded decisions in conditions of uncertainty.

The purpose of the study "Business Statistics using Excel" - to form the future experts knowledge of the theoretical foundations of statistical science, a common methodological approach, as well as practical skills in statistical research in the field of business management in market conditions.

The objectives of teaching the discipline "Business Statistics using Excel": to familiarize undergraduates with existing regulations, reveals the essence of the content of statistical indicators to make the most important statistical and economic calculations with the help of statistical indicators, simulate and analyze using statistical indicators phenomena and processes occurring in the economy in a computer program Excel.

As a result of studying the discipline "Business Statistics using Excel" are formed:

UK-7. To speak a foreign language for communication in an interdisciplinary and scientific environment, in various forms of international cooperation;

SC-11. Be able to analyze formally statistical problems and use computer technology for statistical data processing

As a result of studying the discipline, undergraduates **should know:**

role of statistical techniques and solving practical problems in the field of modern economics and management; main advantages and disadvantages of statistical techniques; basic approaches to decision-making under conditions of uncertainty.

should be able to:

- use Excel for Statistical Data Analysis;
- justify the choice of the method and specific algorithms for processing of statistical data;
- use the results of sample surveys to justify the adoption of managerial decisions in business;
- create and use regression models to analyze economic data;
- identify and interpret statistically significant correlation in the data, use them for planning of economic activity;
- create a statistically-based forecasts to evaluate the accuracy of predictive models;
- interpret the results taking into account emerging statistical errors.

should possess:

skills in assessing specific situations and making decisions on strategic and tactical lines of business activity using statistical tools based on the Excel computer program.

108 hours are allocated for the study of a discipline in full-time education, including classroom 48 hours, of which 28 hours are lectures and 20 hours are laboratory classes. In extramural studies - 12 class hours, including 4 hours of lectures and 8 hours of laboratory classes. The distribution of classroom hours by topic is presented in the educational and methodological maps of the curriculum.

The form of current control – exam.

The structure of the program and the methodology for teaching the discipline take into account the new results of economic research and the latest achievements in the field of pedagogy and information technology, orienting students to the acquisition of relevant professional competencies.

CONTENT OF EDUCATIONAL MATERIAL

Topic 1. Methods of Visualizing and Presenting Data

Classification of data types. Quantitative data: discrete and continuous. Qualitative data: ordinal and nominal. Data presentation methods: tables and graphs. Basic rules for the presentation of data. Frequency Distributions. Process of Constructing a Frequency Table. Graphical Presentation of Qualitative Data. Organizing and Graphing Quantitative Data. Graphing Grouped Data. Ogive.

Topic 2. Data Descriptors

Descriptive statistics. Measures of the central tendency: average value, mode, median. Problems of using measures of the central tendency. Quartiles and percentiles. The concept of variation (variability) Absolute and relative indicators of variation, their advantages, disadvantages. Indicators of asymmetry and excess. Random variables: discrete and continuous. Distribution forms of discrete and continuous random variables. The normal distribution of a continuous random variable. Normal distribution parameters. The use of various types of distribution in the analysis of processes in business. Selection of the distribution law according to available data: Mean and variance of the alternative feature

Topic 3. Methodology of sample surveys. Hypothesis testing

Selective observation: concept, essence, advantages and disadvantages. General and sample aggregate. The formation of a sample for decision-making in business. Probabilistic and improbability samples. Types and methods of selecting units in a sample. Estimation of the parameters of the general population (average / share) based on the results of a sample survey. Introduction to Probability Confidence probability. Significance level Sampling error. Confidence interval for the average / share in the population. Determination of the initial sample size. Testing statistical hypotheses. The concept and formulation of the statistical hypothesis. Zero and alternative hypotheses. Choosing the appropriate hypothesis test method (statistical criterion). Bilateral and unilateral hypothesis testing (bilateral and unilateral tests). Stages of testing statistical hypotheses. Testing statistical hypotheses regarding average values: Student t-test for independent

samples, for paired (dependent) samples, one-sample student t-test. Interpretation of hypothesis test results. Errors of the first and second kind. Chi-Square and Non-Parametric Hypothesis Testing.

Topic 4. Linear Correlation and Regression Analysis

The concept of correlation. Graphic method for evaluating the connection (dispersion diagrams). Correlation coefficient: calculation formula and interpretation of the value. Types of relationships between phenomena and processes. Linear and nonlinear dependencies. The essence of regression analysis. Pairwise linear regression model. Checking the quality of the regression equation. Hypothesis testing regarding the coefficients of the linear regression equation. t-student test. Interpretation of regression coefficients. Checking the overall quality of the regression equation. Determination coefficient R^2 . Fisher F-test. Multiple Regression Model Estimation of the quality of the multiple regression equation. The concept of multicollinearity. Identification of multicollinearity and methods for its elimination. Multiple correlation coefficient and multiple determination coefficient. Prediction based on regression models. Dummy variables Use of correlation analysis to assess the tightness of communication in time series. Models with dichotomous variables. The need to use qualitative dummy variables in regression analysis. Ways to introduce dummy variables into a regression model. Check regression homogeneity of the sample (Chow criterion). Regression models with quantitative and qualitative variables (ANCOVA models). Nonparametric indicators of measuring the tightness of communication (Spearman rank correlation coefficient, Kendal rank correlation coefficient, association coefficient, contingency coefficient, Pearson mutual conjugation coefficient, Fechner coefficient).

Topic 5. Time Series Data and Analysis

Approaches to the analysis of time series. The basic components of a time series. Types of time series for the presence of individual basic components. Methods for evaluating time series components. A time series model that includes trend and seasonality. Methods for identifying the main trend (trend). Estimation of trend equation parameters. Autocorrelation. Methods for detecting, measuring and eliminating autocorrelation. Seasonality index and methods for its calculation.

Seasonal adjustment. Time Series Forecasting Methods. Forecasting time series with trend and seasonal components.

Topic 6. Excel For Statistical Data Analysis

Entering Data. Descriptive Statistics. Normal Distribution. Confidence Interval for the Mean. Test of Hypothesis Concerning the Population Mean. Difference Between Mean of Two Populations/ ANOVA: Analysis of Variances. Goodness-of-Fit Test for Discrete Random Variables. Test of Independence: Contingency Tables. Test Hypothesis Concerning the Variance of Two Populations. Linear Correlation and Regression Analysis. Moving Average and Exponential Smoothing. Time Series Analysis and Business Forecasting.

**Methodical cart for the academic discipline «Business Statistics using Excel »
for full-time education**

Number of topic	Name of section. topic	The number of classroom hours							Other	The form of knowledge control	
		lectures	practical classes	seminars	laboratory classes	Number of hours CAW					
						L	Pr	Lab			
1	2	3	4	5	6	7	8	9	10	11	
1	Methods of Visualizing and Presenting Data	4			2					[3, 4, 5, 6, 8,10, 11, 12, 13]	Laboratory test №1
2	Data Descriptors	2			2					[3, 4, 5, 6, 7, 8, 10, 11, 12, 13]	Laboratory test №2
3	Methodology of sample surveys. Hypothesis testing	6			2					[1, 2, 3, 4, 6, 7, 8, 10, 11, 13]	Laboratory test №3
4	Linear Correlation and Regression Analysis	6			4					[1, 2, 3, 4, 8]	Laboratory test №4
5	Time Series Data and Analysis	6			4					[4, 8]	Laboratory test №5
6	Excel For Statistical Data Analysis	4			6					14	
	Total hours	28			20						exam

**Methodical cart for the academic discipline «Business Statistics using Excel »
for part-time education**

Number of topic	Name of section, topic	The number of classroom hours							Other	The form of knowledge control	
		lectures	practical classes	seminars	laboratory classes	Number of hours CAW					
						L	Pr	Lab			
1	2	3	4	5	6	7	8	9	10	11	
1	Methods of Visualizing and Presenting Data	-			-					[2, 3, 4, 5, 9, 11, 12,]	Laboratory test №1
2	Data Descriptors	-			1					[2, 3, 4, 5, 9, 11, 12,]	Laboratory test №2
3	Methodology of sample surveys. Hypothesis testing	1			1					[2, 3, 4, 5, 9, 11, 12,]	Laboratory test №3
4	Linear Correlation and Regression Analysis	1			2					[2, 3, 4, 5, 9, 11, 12,]	Laboratory test №4
5	Time Series Data and Analysis	1			2					[1,6,7,8]	Laboratory test №5
6	Excel For Statistical Data Analysis	1			2					[13]	
	Total hours	4			8						exam

INFORMATION - METHODOICAL PART

Guidelines for the organization of independent work of students on the discipline «Business Statistics using Excel »

An important step in mastering the knowledge of a discipline is the independent work of students. We recommend a time budget for independent work on average 2 hours for a 2-hour classroom lesson.

The main areas of independent work of students are:

- initially a detailed familiarization with the curriculum;
- familiarization with the list of recommended literature on the discipline as a whole and its sections, its presence in the library and other available sources, the study of the necessary literature on the topic, the selection of additional literature;
- study and expansion of the lecture material of the teacher due to special literature, consultations;
- preparation for laboratory studies according to specially developed plans with the study of special statistical packages of applied programs;
- preparation for the implementation of diagnostic forms of control (survey, tests, etc.);
- preparation for the exam.

REFERENCES

1. Main:

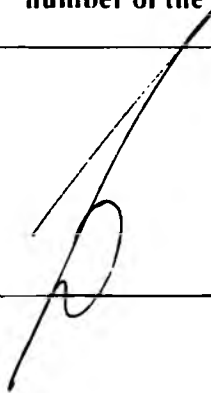
1. Andersen, T.G. Davis, R.A., Kreib, J.P., Mikosch, T. Handbook of Financial Time Series // Andersen T. et al. (Eds.). Springer, 2009. – 1024 p.
2. Hanke, J.E., Reitsch, A.G. Understanding Business Statistics. Boston: IRWIN. - 1991. - 878p.
3. Krehbiel, T. C., Levin, D. M., Berenson, M. L., Basic Business Statistics. Concept and applications. 12th Edition, Prentice Hall. - 2011. - 890p.
4. Lind, D. A., Marchal, W. G., Wathen, S. A.. Basic Statistics for Business & Economics. 8 edition. McGraw-Hill Higher Education – 2013.
5. Siegel, Andrew F. Practical Business Statistics. Fourth edition. Elsevier: Academic Press. – 2014. - 1050 p.

2. Additional:

6. Anari, A., Kolari, J.W. Excel-Based Business Analysis forecasting Key Business Trends. 2014. - 59 p.
7. Andersen, T.G., Bollerslev, T. - Intraday periodicity and volatility persistence in financial markets. Evanston: Elsevier Science B.V. 1997.
8. Box, G.E.P., Jenkins, J.M., Reinsel, G.C. Time Series Analysis: Forecasting and Control. – 4th ed. Wiley, 2008. – 756 p.
9. Fernandes, M. Statistics for Business and Economics. Ventus Publishing Aps. 2010.
10. Lewis, C. D. Industrial And Business Forecasting Methods: A Practical Guide To Exponential Smoothing And Curve Fitting. London : Butterworth Scientific, 1982. -143 p.
11. Mercik, J. W. Business Statistics. Six Lectures on Statistics. Wrocław University of Technology. Wrocław. - 2015. – 96 p.
12. Tiemann, Thomas K. Introductory Business Statistics. Copyright © 2010 by Thomas K. Tiemann. The Global Text Project is funded by the Jacobs Foundation, Zurich, Switzerland. -2016.
13. Электронный ресурс <http://home.ubalt.edu/ntsbarsh/Business-stat/excel/excel.htm#rintro>

Protocol

for the coordination of the training program on the academic discipline
with other disciplines of the specialty

Title of the discipline coordination with which is required	Department title	Offers on changes in training program contents of academic discipline	The decision made by the Department which developed the training program (with the indication of date and number of the protocol)
Business Analysis	Department of Accounting, Analysis, Audit in branches of the national economy	нет	

**Additions and changes to the training program
for higher education establishment
For the academic year 20__/20__**

N umber	Additions and changes	Reason

The program is revised and approved at the meeting of the Statistics Department (protocol № __, _____)

Head of Department _____

N.V. Agabekova

APPROVE

Dean of Faculty of Digital Economy

D.A. Marushko