

UNIVERSITY OF ECONOMICS - VARNA
FACULTY OF INFORMATICS
DEPARTMENT OF STATISTICS AND APPLIED MATHEMATICS

Adopted by the FC (record № 9/24.04.2024)

Adopted by the DC (record № 6/15.04.2024)

ACCEPTED BY:

Dean:

(Prof. Vladimir Sulov, PhD)

SYLLABUS

SUBJECT: STATISTICAL ANALYSIS

DEGREE PROGRAMME: All programs taught in English; BACHELOR'S DEGREE

YEAR OF STUDY: 3; SEMESTER: 6

TOTAL STUDENT WORKLOAD: 150 hours; incl. curricular 60 hours

CREDITS: 5

DISTRIBUTION OF STUDENT WORKLOAD ACCORDING TO THE CURRICULUM

<i>TYPE OF STUDY HOURS</i>	WORKLOAD, hours	TEACHING HOURS PER WEEK, hours
CURRICULAR: incl. - LECTURES - SEMINARS / LAB. EXERCISES	30 30	2 2
EXTRACURRICULAR	90	-

Prepared by:

1.
(Assoc. Prof. Radan Miryanov, PhD)
2.
(Ch. Assist. Prof. Svetlana Todorova, PhD)
3.
(Ch. Assist. Prof. Slaveya Zhelyazkova, PhD)

Head of department
of Statistics and Applied Mathematics:
(Assoc. Prof. Tanka Milkova, PhD)

I. ANNOTATION

Statistical Analysis is a university special discipline, the main objectives of which are:

- 1. Clarifying the philosophy, logic and stages of conducting statistical research through the collection, organizing and analysis of statistical information.*
- 2. The creation of skills for correct selection and application of statistical tools according to the nature of the data.*
- 3. Creation of skills for critical judgment and for correct interpretation of statistical information and results of conducted statistical study.*

In accordance with the formulated goals, the training in "Statistical Analysis" serves the development of the following key competences:

- Mathematical competence (ability to solve problems, formulate solutions, to apply formulas, models, to work with statistical data; development of mathematical, in particular statistical thinking);*
- Digital competence (ability to search and find relevant information, to work with databases, to use statistical software for analysis purposes);*
- Personal competence (skills for solving real problems);*
- Entrepreneurial competence (development of critical thinking and attitude to statistical information; analytical thinking, forecasting; awareness of socio-economic trends; creativity, and curiosity).*

The knowledge and skills acquired in the discipline "Statistical Analysis" can find application in all fundamental and special disciplines where mass phenomena are the subject of research, such as "Microeconomics", "Macroeconomics", "Introduction to Finance", "Theory of management", "Marketing", "Accounting theory" and others, as well as when conducting research in the branches of the economy.

Training in Statistical Analysis is carried out through lectures and seminars. In them, both the theoretical problems of statistics and the practical-applied aspects of the statistical processing of information are considered.

II. THEMATIC CONTENT

№	TITLE OF UNIT AND SUBTOPICS	NUMBER OF HOURS		
		L	S	L.E.
Theme 1. PRINCIPLES OF STATISTICAL STUDIES		2	2	
1.1.	Nature and Purpose of Statistical Studies			
1.2.	Stages of Statistical Study			
1.3.	Object and Subject of Statistical Study			
1.4.	Collection and Presentation of Data			
1.5.	Selection of Appropriate Statistical Methods for Data Analysis			
1.6.	Problems and Errors in Conducting Statistical Studies			
Theme 2. SAMPLE SURVEYS		2	2	
2.1.	Principles of Sample Survey			
2.2.	Sampling Techniques			
2.3.	Guidelines for Conducting Sample Surveys			
2.4.	Sampling Distributions			
2.5.	Sample Generation Using Statistical Software			
Theme 3. ESTIMATION		6	6	
3.1.	Basic Concepts of Estimation			
3.2.	Statistical Estimation of Population Parameters Based on Standard Normal Distribution			
3.3.	Statistical Estimation of Population Parameters Based on The Bi-			

	nomial Distribution			
3.4.	Statistical Estimation of Population Parameters Based on Poisson Distribution			
3.5.	Determining Sample Size			
Theme 4. PARAMETRIC HYPOTHESIS TESTS		4	4	
4.1.	Nature and Logic of Statistical Hypothesis Testing			
4.2.	Hypothesis Tests About the Population Mean, Proportion and Variance			
4.3.	Hypothesis Tests About the Difference Between Two Population Means, Two Population Proportions and Two Population Variances			
4.4.	One-Way and Two-Way Analysis of Variance			
4.5.	Application of Statistical Software in Parametric Hypothesis Testing			
Theme 5. NONPARAMETRIC HYPOTHESIS TESTS		4	4	
5.1.	Chi-Square Test of Independence			
5.2.	Chi-Square Goodness-of-Fit Test and Kolmogorov-Smirnov Test			
5.3.	Test for Representativeness of a Sample			
5.4.	Sign Test and Wilcoxon's Signed Rank Test			
5.5.	Wilcoxon's Rank Sum Test and Mann-Whitney Test			
5.6.	Kruskal-Wallis Test			
5.7.	Application of Statistical Software in Nonparametric Hypothesis Testing			
Theme 6. ANALYSIS OF RELATIONSHIP BETWEEN VARIABLES		6	6	
6.1.	Correlation: Parametric and Nonparametric Measures			
6.2.	Simple Linear Regression Model - Estimation of Parameters and Detection of Heteroskedasticity and Autocorrelation of Residuals			
6.3.	Statistical Inference in the Simple Linear Regression Model			
6.4.	Multiple Linear Regression Model - Estimation of Parameters and Detection of Multicollinearity			
6.5.	Statistical Inference in the Multiple Linear Regression Model			
6.6.	Alternative Functional Forms for Regression Equations			
6.7.	Application of Statistical Software in Correlation and Regression Analysis			
Theme 7. TIME SERIES ANALYSIS		6	6	
7.1.	The Nature of Time Series Data. Essential Requirements of Time Series. Types of time series			
7.2.	Linear Trend Model and Forecasting			
7.3.	Nonlinear Trend Models and Forecasting			
7.4.	Application of Statistical Software in Time Series Modelling			
Total:		30	30	

III. FORMS OF CONTROL:

№	TYPE AND FORM OF CONTROL	Number	extracurricular, hours
1.	Midterm control		
1.1.	Midterm Exam (theoretical and practical problems 50:50)	1	15
1.2.	Quizzes (theoretical and practical problems 50:50)	2	20
1.3.	Team Projects (based on real-world data)	2	25
	Total midterm control:	5	60
2.	Final term control		
2.1.	Examination–Final Exam (theoretical and practical problems 40:60)	1	30
	Total final term control:	1	30
	Total for all types of control:	6	90

IV. LITERATURE

REQUIRED (BASIC) LITERATURE:

1. Anderson, David R., et al. Statistics for Business and Economics, Cengage Learning, 12th edition, 2014, XVI, 638 p., 978-1-4080-7223-3. (Library of the University of Economics, e-sources: <https://eclipse.ue-varna.bg/catalog/view/LG5YHN87EG>).
2. Lee, Nick, Peters, Mike. Business Statistics Using EXCEL and SPSS. Los Angeles: SAGE Publisher, 2016, XVI, 561 p., 978-1-84860-219-9. (Library of the University of Economics).
3. Winston, Wayne L. Microsoft Excel Data Analysis and Business Modeling, Microsoft Press, 2016, XXVI, 837 p., 978-1-5093-0421-9. (Library of the University of Economics).

RECOMMENDED (ADDITIONAL) LITERATURE:

1. Jaggia Sanjiv, Alison Kelly, Business Statistics – Communicating with Numbers, 4th edition, McGraw-Hill Publishers, 2022, 800 p., 978-1264218882 (e-book).
2. Newbold, Paul. William L. Carlson and Betty M. Thorne. *Statistics for business and economics*, 8th edition, Pearson, 2013, 795 p., 978-0-13-274565-9. (*Web Page of the Course*).
3. Weiss, Neil A. Introductory Statistics. 9th edition, Edinburgh: Pearson, 2014, II, 894 p., 978-1-292-02201-9. (Library of the University of Economics).