UNIVERSITY OF ECONOMICS - VARNA
FACULTY OF ECONOMICS
DEPARTMENT „INDUSTRIAL BUSINESS AND LOGISTICS"

Adopted by the FC (record № 11/ 25. 04. 2024)

Adopted by the DC (record № 9/ 16. 04. 2024)

ACCEPTED BY:

Dean:

(Assoc. Prof. Dr. Denka Zlateva)

SYLLABUS

SUBJECT: APPLIED STSTISTICS FOR BUSINESS;

DEGREE PROGRAMME: Business and Management; BACHELOR`S DEGREE

YEAR OF STUDY: 3; SEMESTER: 5;

TOTAL STUDENT WORKLOAD: 180 h.; incl. curricular 60 h.

CREDITS: 6

DISTRIBUTION OF STUDENT WORKLOAD ACCORDING TO THE CURRICULUM

TYPE OF STUDY HOURS	WORKLOAD, hours	TEACHING HOURS PER WEEK, hours
CURRICULAR: incl.		
• LECTURES	30	2
• SEMINARS / LAB. EXERCISES	30	2
EXTRACURRICULAR	180	-

Prepared by:

1. ……………………………..
   (Assoc. Prof. Dr. Ivan Petrov)

2. ……………………………………
   (Ch. Assist. Prof. Dr. Svetlana Todorova)

**Head of the department
of „Industrial Business and Logistics": ………………………………………**

(Assoc. Prof. Dr. Plamen Pavlov)

I. ANNOTATION

The course of Applied Statistics for Business emphasizes the applications of statistical analysis to real-world business and economic problems. Content will include but not be limited to data visualization, measures of central locations and dispersion, correlation and regression, sampling distributions, and the assumptions associated with and the application of selected inferential statistical procedures (including t-tests, one-way ANOVA, Nonparametric Tests, and etc.). The statistical software package SPSS, which is widely used in teaching and business, will be employed to assist in the analysis of data for this course. This course will provide a step-by-step guide to research design and data analysis using SPSS and some free online calculators.

The objectives of the course are:

- To provide you with an understanding of statistical methods and techniques and their usefulness in the decision-making process.

- To teach the practical side of exploring, presenting, and analyzing data and learn how to effectively use a statistical software package SPSS to accomplish these tasks.

- To expose you to the methods of descriptive and inferential statistics. These methods can be used to solve business and economics problems.

- To improve upon your data analysis and computer skills.

- To help you develop the skill to recognize the appropriate statistical tool to analyze business problems.

- To provide you with the necessary tools for critical evaluation, correct interpretation, and presentation of the results of the research analyses.

- To recognize the impact of the analyses on the broader society and the attendant ethical obligations to perform your work responsibly.

The objectives of the course "Applied Statistics for Business" developed the following key competencies:

- Mathematical competencies (ability to solve problems, formulate solutions, apply formulas, models, concepts, deal with statistical data; develop mathematical and statistical thinking);

- Digital competencies (ability to search the relevant information, deal with spreadsheets, databases, and Statistical software);

- Personal competencies (skills for solving the real-world problems);

- Entrepreneurial competencies (development of critical thinking of statistical data; analytical thinking, forecasting; teamwork, awareness of socio-economic trends; creativity, and curiosity);

- Language competencies (development of the vocabulary of statistical terminology in English);

II. THEMATIC CONTENT

No	TITLE OF UNIT AND SUBTOPICS	NUMBER OF HOURS		
		L	S	L.E
1. Data and Data Preparation		2	0	
	Various Data Types. Structured and Unstructured Data. Big Data			
	Variables and Scales of Measurement			
	Data Preparation: Counting and Sorting; Handling Missing Values, and Subsetting			

2. Brief Introduction to "Statistical Package for the Social Sciences" (SPSS)	**2**	**2**	
Getting Started with SPSS			
Data Entry: Data View Spreadsheet & Variable View Spreadsheet			
The Statistics Menus			
The Output Viewer			
The Chart Editor			
Data Coddling			
Data Validation			
Transforming Variables			
3. Tabular and Graphical Presentations	**4**	**4**	
Types of Data and Data Visualization			
Methods to Visualize a Categorical Variable			
Methods to Visualize the Relationship Between Two Categorical Variables. Contingency Tables			
Methods to Visualize a Numerical Variable			
Methods to Visualize the Relationship Between Two Numerical Variables. Scatter Diagram			
More Visualization Methods			
SPSS Quick start I			
4. Numerical Descriptive Measures	**4**	**4**	
Measures of Central Tendency: Mode, Median, and Mean			
Measures of Location: Quartiles and Percentiles			
Measures of Dispersion (Variability): Range, IQR, Variance, Standard Deviation, and Coefficient of Variation			
Distribution Shape and Boxplot			
Measures of Association between Two Numerical Variables. Calculations of the Pearson's Correlation Coefficient in SPSS			
SPSS Quick start II			
5. Statistical Inference Concerning One Population	**4**	**4**	
Point and Interval Estimation t-test. Illustrative examples using SPSS			
Hypothesis Testing for a Population Mean t-test. Illustrative examples using SPSS			
Control Charts. Using Excel to Create a Control Charts for Quantitative Data			
Effect Size versus Statistical Significance. Cohen's d Effect Size			
Using Statistics Kingdom (free online calculator) to Calculate Cohen's d Effect Size for One-sample t-test			
6. Statistical Inference Concerning Two Populations	**4**	**6**	
Inference Concerning the Difference between Two Means: Independent Samples t-test. Illustrative examples using SPSS			
Levene's Test for Equality of Variances			
Using Statistics Kingdom (free online calculator) to Calculate Cohen's d Effect Size for Two-sample Equal Variances t-test			
Using Statistics Kingdom (free online calculator) to Calculate Cohen's d Effect Size for Two-sample Unequal Variances t-test			
Inference Concerning Mean Differences: Matched Paired Samples. Illustrative examples using SPSS			

7. Statistical Inference Concerning More Than Two Populations	**2**	**2**	
Inference Concerning the Difference Among Many Means: One-way ANOVA. Illustrative examples using SPSS			
Post Hoc Multiple Comparison. Fisher's Least Significant Difference (LSD) test in SPSS			
8. Regression Analysis	**4**	**4**	
The Linear Regression Models. Goodness-of-Fit Measures. SPSS output			
Model Assumptions, Residual Analysis, and Common Violations			
Inference with Regression Models: Tests of Individual and Joint Significance			
Regression Models with Dummy Variables. Dummy Variables Based on Categorical Variables with Two or Multiple Categories. Interactions with Dummy Variables			
SPSS Quick start III			
9. Nonparametric Tests	**4**	**4**	
Relationship between Two Categorical Variables. Chi-squared Test of Independence. Illustrative examples using SPSS			
Testing a Population Median. Willcoxon Signed-Rank Test for a Population Median in SPSS			
Testing Two Population Medians. Mann-Whitney U Test for Independent Samples in SPSS			
Testing More Than Two Population Medians: Kruskal-Wallis Test in SPSS			
Testing the Correlation between Two Variables. Calculations of the Spearman's Rank Correlation Coefficient and the Kendall's Rank Correlation Coefficient in SPSS			
Total:	**30**	**30**	

III. FORMS OF CONTROL:

No. by row	TYPE AND FORM OF CONTROL	№	extra-curricular, h.
1.	**Midterm control**		
1.1.	Midterm Exam (theoretical and practical problems 40:60)	1	30
1.2.	Quiz (theoretical and practical problems 30:70)	1	20
1.3.	Team Projects (based on real-world data)	2	80
	Total midterm control:	**4**	**130**
2.	**Final term control**		
2.1.	Final Exam (based on real-world problem)	1	50
	Total final term control:	**1**	50
	Total for all types of control:	**5**	**180**

IV. <u>LITERATURE</u>

REQUIRED (BASIC) LITERATURE:

1. Camm, Jeffrey D., James J. Cochran, Michael J. Fry, Jeffrey W. Ohlmann, David R. Anderson, Dennis J. *Modern Business Statistics with Microsoft Excel*, Cengage Learning, 8th edition, 2025, 1062 p.
2. George, Darren, Paul Mallery. *IBM SPSS Statistics 29 Step by Step. A Simple Guide and Reference*. 18th edition, Routledge, 2024, 424 p.
3. Mann Whitney U test calculator [Internet]. Statistics Kingdom 2017 [cited 25 October 2019]. Available from: *http://www.statskingdom.com/170median_mann_whitney.html*.

RECOMMENDED (ADDITIONAL) LITERATURE:

1. Agresti, Alan. An Introduction to Categorical Data Analysis, Wiley, 2019, XIII, 375 p., 9781119405269. (Library of the University of Economics, e-sources: https://eclipse.ue-varna.bg/catalog/view/NWP8H4AB6W)
2. 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*)
3. Brace, Nicola, Kemp, Richard, Snelgar, Rosemary. *SPSS for Psychologists*, Palgrave Macmillan, 2016, XIII, 419 p., 978-1-137-57922-5. (*Library of the University of Economics*)
4. Field, Andy. *Discovering Statistics Using IBM SPSS Statistics*, SAGE Publ., 2017, 1072 p., 978-1-5264-1951-4. (*Library of the University of Economics*)
5. Jaggia Sanjiv, Alison Kelly*, Business Statistics – Communicating with Numbers*, 4th edition, McGraw-Hill Publishers, 2022, 800 p., 978-1264218882 (ebook).
6. 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*)
7. Maclnnes, John. *An Introduction to Secondary Data Analysis with IBM SPSS Statistics*, SAGE Publ., 2017, X, 324 p., 978-1-4462-8576-3. (*Library of the University of Economics*)
8. Pallant, Julie. *SPSS Survival Manual*, McGRAW-HILL, 2016, XI, 352 p., 978-0-33-526154-3. (*Library of the University of Economics*)