

Annex No. 3		Second Cycle Studies Course Programme			
1.	Course Title	Multivariate analysis			
2.	Code	STM 513			
3.	Study programme	Statistical Methods for Business and Economics			
4.	Organizer of the study programme (university unit i.e. institute, chair, department)	Ss. Cyril and Methodius University in Skopje Faculty of Economics - Skopje			
5.	Level (first, second, third cycle)	Second cycle			
6.	Academic year / semester	First year (Winter semester)	7.	Number of ECTS credits	6
8.	Professor	Prof. Marija Trpkova-Nestorovska, PhD			
9.	Preconditions for enrolment	Completed first cycle of studies with minimum 240 credits			
10.	<p>Course Objectives (Competencies): After taking this course and passing the exam, students should be able to:</p> <ul style="list-style-type: none"> ▪ Understand the multivariate analysis as a group of analytical methods and recognize when its application is appropriate; ▪ Understand the measurement scales and their relations in multivariate techniques, to know about the measurement errors and their impact on multivariate analysis; ▪ Determine which multivariate technique is appropriate for a particular research problem; ▪ Prepare the data for analysis by graphical presentation, solving the missing data problems, testing the assumptions that are the basis for multivariate techniques; ▪ Know the exploratory factor analysis – to differentiate from other multivariate techniques and confirmatory factor analysis, to describe how to determine the number of factors, the concept of factor rotation, description and naming of the factors where this technique finds its application; ▪ Learn about multivariate regression analysis and when it should be applied, consider the assumptions of the regression model and how to address them, choosing an estimation technique and interpretation of the results; ▪ Know the circumstances when the usage of discriminant analysis is more appropriate for multiple regression, know the assumptions of the discriminant analysis, know about the classification matrix and how to calculate it, describe the way of evaluation of prediction accuracy of the discriminant function, to identify the independent variables with discriminating power; ▪ Define cluster analysis, know its usage and limitations, to make a difference between hierarchical and non-hierarchical clustering techniques and how to interpret the results; ▪ Know how to use the statistical software SPSS, its application in data preparation and conducting the multivariate techniques. 				
11.	<p>Course content: Multivariate techniques are a particular form of analysis methods that enable organizations to create knowledge and improve their decision making for significant issues. The multivariate analysis consists of all statistical techniques that simultaneously analyze more measurements that refer to people or objects that are the subject of the research. Any simultaneous analysis of more than two variables can be classified as a multivariate technique. This course describes the basic techniques of multivariate analysis that include exploratory factor analysis, multiple regression analysis, discriminant analysis and cluster analysis. To prepare for studying multivariate techniques, students must first learn how to use the SPSS statistical software, make an initial screening and presentation of the data, and test the assumptions that are crucial for the relevance of the results. Contents of the subject include:</p> <ul style="list-style-type: none"> ▪ Introduction to multivariate analysis ▪ Introduction for statistical software SPSS 				

	<ul style="list-style-type: none"> ▪ Preparation and presentation of data ▪ Exploratory factor analysis ▪ Multiple regression analysis ▪ Discriminant analysis ▪ Cluster analysis 				
12.	Learning methods: Lectures with presentations, interactive lectures using computers, statistical software and databases, individual projects with presentation, guest lecturer, and case studies.				
13.	Total hours	6 ECTS x 30 classes = 180 classes			
14.	Allocation of hours per activity	24+16+40+10+90=180 classes			
15.	Types of teaching activates	15.1.	Lectures	24 classes	
		15.2.	Exercises (Seminars)	16 classes	
16.	Other types of activities	16.1.	Project/research (Written or oral presentation)	40 classes	
		16.2.	Individual tasks	10 classes	
		16.3.	Home studying	90 classes	
17.	Grading method: 50+40+10=100 points				
	17.1.	Tests (Domain, Essay, Multiple choice exam, Case)	50%		
	17.2.	Project/research (Written or oral presentation)	40%		
	17.3.	Attendance and class participations	10%		
18.	Grading scale	less than 50 points	5 (five) (F)		
		from 51 to 60 points	6 (six) (E)		
		from 61 to 70 points	7 (seven) (D)		
		from 71 to 80 points	8 (eight) (C)		
		from 81 to 90 points	9 (nine) (B)		
		from 91 to 100 points	10 (ten) (A)		
19.	Preconditions for taking the final exam	Realized activities from points 15 and 16			
20.	Language	Macedonian (or English)			
21.	Evaluation method	Internal evaluation and survey			
22.	Literature				
	22.1.	Compulsory literature			
		No.	Author	Title	Publisher
		1.	Hair, Joseph F., Anderson, Rolph E., Black, William C.	Multivariate Data Analysis (Ed. 7th)	Harlow: Pearson.
		2.	Field, A.	Discovering Statistics Using IBM SPSS statistics (Ed. 3 rd)	SAGE Publications
	Year	2014			

	22.2.	Additional literature				
		No.	Author	Title	Publisher	Year
		1.	Johnson, W.	Applied Multivariate Statistical Analysis (Ed. 6 th)	Prentice Hall	2007
		2.	Stevens, J.P.	Applied Multivariate Statistics for the Social Sciences (Ed. 5 th)	Taylor & Francis Group	2009
		3.	Pallant, J.	SPSS Survival Manual A Step by Step Guide to Data Analysis Using SPSS (Ed. 4 th)	Allen & Unwin	2011